Toward a More Explicit Doctoral Pedagogy

by

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A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved April 2012 by the
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ARIZONA STATE UNIVERSITY

May 2012

ABSTRACT

The purpose of this mixed-methods study was to understand the key constructs and processes underlying the mentoring relationships between doctoral students and their mentors. First, exploratory and confirmatory factor analyses were used to evaluate the measurement structure underlying the 34-item Ideal Mentor Scale (IMS; Rose, 2003), followed by an examination of factorial invariance and differences in latent means between graduate students differing by gender, age, and Master's vs. Doctoral status. The IMS was administered to 1,187 graduate students from various departments across the university at Arizona State University (ASU); this sample was split into two independent samples. Exploratory factory analysis on Sample 1 (N = 607) suggested a new four-factor mentoring model consisting of Affective Advocacy, Academic Guidance, Scholarly Example, and Personal Relationship. Subsequent confirmatory factor analysis on Sample 2 (N = 580) found that this four-factor solution was superior to the fit of a previously hypothesized three-factor model including Integrity, Guidance, and Relationship factors (Rose, 2003). Latent mean differences were evaluated for the four-factor model using structured means modeling. Results showed that females placed more value on factors relating to Affective Advocacy, Academic Guidance, and Scholarly Example, and less value on Personal Relationship than males. Students 30 and older placed less value on Scholarly Example and Personal Relationship than students under 30. There were no significant differences in means for graduate students pursuing a Master's versus a Doctoral degree.

Further study qualitatively examined mentoring relationships between doctoral students and their faculty mentor using the Questionnaire on Supervisor Doctoral Student Interaction (QSDI) coupled with semi-structured interviews. Graduate support staff were interviewed to gather data on program characteristics and to provide additional context.

Data were analyzed using Erickson's Modified Analytical Inductive method (Erickson, 1986). Findings showed that the doctoral students valued guidance, advocacy and constructive, timely feedback but realized the need to practice self-reliance to complete. Peer mentoring was important. Most of the participants valued a mentor's advocacy and longed to co-publish with their advisor. All students valued intellectual freedom, but wished for more direction to facilitate timelier completion of the degree. Development of the scholarly identity received little or no overt attention.

This is dedicated to my husband, Hersh Garrett,

who never stopped believing in me.

Thank you, my Love!

ACKNOWLEDGMENTS

My committee members have been extraordinarily patient with my decade-long journey to complete my doctoral degree. I am very grateful to them for their patience and their encouragement. When it seemed as though I would never get to the goal, they still encouraged me to "hang in there."

Marilyn, you accepted me into the program those many years ago and did not know how you would affect my life. Mary Lee, you opened up the world of mixed-method and evaluation inquiry to me and changed what I wanted to do for the rest of my life. Shelly, you have been there every step of the way encouraging me and persevering with me, and for that I am incredibly grateful.

My great appreciation goes out to Yixing Liu who was instrumental in the analysis of the quantitative data produced by this study. She knew software programs and methods with which I had had no experience and I am truly grateful for her collaboration.

Again I wish to express my thanks to Jodi Swanson who spared me the frustration and anxiety of producing the final, formatted version of this dissertation. Jodi, you have, again, remained a constant cheerleader on the sidelines. Thank you!

This study was funded, in part, by a Graduate and Professional Student Association Graduate Research Support Grant awarded to Pamela Garrett.

To the rest of my family who have always continued to believe in me, I hope I have taught you that it is never too late to follow your dreams and reach your goals!

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CHAPTER 1

Introduction

If graduate schools were in the K-12 education system and only managing to graduate approximately half of their doctoral students, they would be considered "Underperforming" or even be closed down for failing to meet academic standards. The fact that doctoral students complete their degrees at rates ranging from 49% for Social Sciences to approximately 64% for Engineering should be a red flag instead of an accepted fact of life in graduate school (Council of Graduate Schools, 2008).

Using a component, mixed-methods design, this study sought to understand the key constructs and processes underlying the mentoring relationships between doctoral students and their mentors. In a component mixed-method design the quantitative data gathering and data analysis activities are undertaken separately from the qualitative data gathering and data analysis activities. Data are combined only at the level of interpretation and conclusions (Caracelli & Greene, 1997). The mixed method design was employed to maximize the data generated and to qualitatively expand the scope of inquiry in order to possibly achieve triangulation through data gathered. The quantitative and qualitative data analysis was a discrete process. Data were analyzed separately and examined for convergence at the conclusion of the study.

Two key components of the study were to evaluate the construct validity of the Ideal Mentor Scale (IMS) and to understand the lived experience of the mentoring relationships between doctoral students and their mentors. I sought to

understand the particular experiences and emic perspectives as well as the general constructs and processes. Reality is complex and social so that the addition of a qualitative component to the study design enabled me to serve a broader set of interests in the resulting assertions. I sought validity through coherence across multiple lines of evidence (Smith, 1997).

Data for the quantitative component of the study were gathered through survey methods. Data for the qualitative component of the study were gathered through semi-structured interviews of doctoral students and graduate support staff for each of their programs in an effort to achieve triangulation of data. The study design called for quantitative data analysis, including exploratory and confirmatory factor analysis and examination of latent mean differences, of the survey data generated by 1187 graduate student participants at ASU. Erickson's modified analytical inductive approach to data collection and analysis (Erickson, 1986) was used to analyze qualitative data.

In addition to the research purposes for the study, data emerged from the interviews of graduate support staff that illuminated practices within the university designed to assist doctoral students to complete their degrees in a timely fashion. Practices that were deemed to be non-discipline specific are included in a section of the report devoted to enumerating possible strategies to assist doctoral students to complete their studies and increase satisfaction with the experience.

In order to bound the study and guide construction of the interview protocols, the study incorporated inquiry into Boyer's four domains of scholarship

as described in *Scholarship Reconsidered: Priorities of the Professorate* (Boyer, 1997). Scholarship of Application is defined by Boyer as engagement within and outside the institution. Scholarship of Discovery is defined by Boyer as research and pursuit of new knowledge. Scholarship of Integration is defined as interdisciplinary collaboration, and Scholarship of Teaching is defined to include not only the act of teaching, but assessment of practice and continued improvement of teaching through research and publication.

The research questions were:

- *Is the Ideal Mentor Scale (IMS) a valid measure to assess Integrity, Guidance, & Relationship desires of Doctoral students as they relate to their perception of an ideal mentor at a large Research 1 university?*
- *How do Doctoral students perceive the relationship between themselves and their supervising faculty member?*
- *How do Doctoral students perceive their own and the supervisor's role in the process of scholarly identity development?*
- *To what extent is each of Boyer's four Domains of Scholarship explicitly addressed in doctoral student training?*

In the following chapter I discuss the globalization of doctoral training including a discussion of several models of doctoral education across the globe. I then discuss the possibility of modifying the American model of doctoral education toward a more explicit doctoral pedagogy, followed by a discussion of the development of the scholarly identity. Following is a discussion of doctoral

training as pedagogy, and a more detailed discussion of Boyer's four domains of scholarship. Finally, I present my conceptual framework for the study and my researcher perspective.

CHAPTER 2

Literature Review

Globalization of the Knowledge Economy

The doctorate still serves, almost exclusively, as the gateway to the professorate not just here in the United States, but globally (Nerad, 2008); however, doctoral programs these days are also in the business of ensuring the production of highly skilled, competitive workers for an international knowledge economy that may reside within or outside of the Academy. Many 21st century problems transcend single disciplinary knowledge and require not only interdisciplinary collaboration, but global collaboration to solve. "Doctoral education will continue to need to respond to external market forces, including meeting demands for interdisciplinary-trained scholars who can solve large societal problems, and do so while working in teams and across national boundaries" (Powell & Green, 2007).

In further recognition of the increasingly global nature of doctoral education and the changing nature of the labor market (Bitusikova, 2009), the European Union initiated an intergovernmental initiative called the Bologna Process. The European doctoral training system is highly complex, and the Ph.D. degree is issued by more than a thousand universities spanning more than 46 countries (p. 2). Doctoral education in Europe has been largely unstructured and primarily took the form of individual study under the guidance of the supervisor, an apprentice model (p. 2). In an effort to bring more structure and consistency across the European Union, yet maintain their individuality ("one goal, different

routes"), members of the European Union signed the Bologna Declaration in 1999. Their goal, by 2010, was to improve the international competitiveness and attraction of European higher education throughout the world (Clement, McAlpine, & Waeytens, 2004) through:

- The creation of a common frame of reference to understand and compare diplomas;
- The restructuring of programs at undergraduate and graduate levels, where the undergraduate program is a prerequisite for a graduate program and where an undergraduate diploma is relevant for the labor market;
- The general implementation of credit systems that are compatible with the European Credit Transfer and Accumulation System;
- A European dimension to quality assurance; and
- The reduction of impediments to student and teacher mobility.

As a result of the process of enacting Bologna, many universities have established structured training programs with coursework and research phases, in addition to the traditional individual apprentice models that are strictly research models. These programs, unlike in the past, are being established under the administrative control of doctoral, graduate, or research schools (Bitusikova, 2009, p. 3).

> First assessments have found that these structures "stimulate the research environment, provide critical mass and help young

researchers overcome isolation, bring junior and senior researchers together, support and improve supervision, make the admissions process more transparent with clearly defined procedures, provide teaching and generic skills training, guarantee quality assurance and monitoring, and enhance opportunities for international and inter-institutional collaboration and mobility as well as for interdisciplinarity." This new administrative structure has added to the European model these modern benefits while still retaining the individual apprenticeship model (primarily in social sciences and humanities). It has also maintained individuality across institutions.

In 1999, in an effort to become more globally competitive, the Australian government mandated changes to their doctoral education. A policy statement on research and research training outlined the need for reform to strengthen Australia's research capacity and achieve standards of excellence previously lacking. This change resulted in the production of a flurry of research on postgraduate supervision. The policy contained the following features (Kemp, 1999):

- an invigorated national competitive grants system to be administered by a restructured, strengthened and independent Australian Research Council;
- an enhanced strategic and priority setting role for institutions in relation to research and research training;

- research scholarships designed to provide research students with greater choice and influence in relation to their research training environment; and
- incentives to reward institutional diversity, strong strategic focus, enhanced collaboration with other participants in the research and innovation systems, and research training environments that are responsive to the needs of students and employers.

Similar to the issues we currently face in the United States, Australian employers felt that the research degree graduates from Australian universities were not adequately prepared for employment outside of the Academy, the present system of funding did not sufficiently encourage diversity and excellence, and too much funding and resources were being spent on postgraduate education associated with long completion times and low completion rates for postgraduate students pursuing higher and terminal degrees (Kemp, 1999, p. 2).

The government's vision for research and research training mandated in the policy was:

- ensure Australia is able to maintain and develop its research competence and international credibility across a wide range of fields of knowledge;
- facilitate the provision of diverse, high quality research training environments;

- encourage the expansion of the total national investment in research;
- expand opportunities and choice for research students;
- enable research organizations to respond flexibly to changes in the development of and demand for knowledge;
- secure and strengthen Australia's internationally regarded basic research effort;
- support the development and dissemination of knowledge for its own sake as well as the social and cultural benefits it will bring to the wider community;
- extend the contributions of higher education research to the national innovation system through closer links with industry; and
- make more effective and visible the impact of research and research training on national economic competitiveness, social problem solving and community well-being (Kemp, 1999, p. 4).

Whereas the U.S. government has not mandated widespread changes to doctoral training, it is commonly accepted that our education system is subject to the same global pressures for excellence and research capacity that can transcend disciplinary boundaries. The primary reason the government has not mandated these types of changes is because our university system is highly autonomous. Funding for doctoral training can come through grants from governmental sources

such as the National Science Foundation (NSF) and the National Institutes for Health (NIH), but that is not the only source of funding for doctoral education. Further, unlike other countries, our government is not mandated to directly support doctoral students' living expenses during their training.

Even though we are seeing more governments mandating higher standards for graduate education and more accountability in terms of persistence, time-to-degree, completion, and attrition, most publicly funded university systems are facing reduced government funding around the world.

Next I discuss the European model of doctoral education beginning with a bit of historical context.

European Model of Doctoral Education

The European model of doctoral education is quite different from the American model. In the beginning, the foundational principal of the doctorate in Germany was unity of teaching and research (Gellert, 1993). Research was closely intertwined with teaching and research results were used for teaching purposes. In the UK, on the other hand, teaching is limited and the doctoral education provides no training in teaching (Becher, 1993). Teaching responsibilities are not an established part of doctoral student life in the UK (p. 133).

The doctoral candidate, as they are called from the beginning, pursues a Ph.D. strictly as a research apprentice to prepare for research and teaching. Due to the structure of their undergraduate education, doctoral candidates have narrowed their disciplinary interests prior to the time doctoral studies are begun and have a

reasonably advanced understanding of their major field (Becher, 1993). Specialization begins in secondary school where they concentrate on a narrow range of three to four subjects (p. 115). The European education is strongly geared to "first-degree" production, particularly in the UK, and doctoral education is somewhat marginalized due to the higher demand for first degrees (essentially a Bachelor's degree). "Work for the first degree is thus considered a basis for research degrees, where knowledge and academic skills on entry are to some extent taken for granted" (Henkel & Kogan, 1993).

The European model is an apprenticeship model and there is no formal coursework associated with the process; although as stated before, changes are taking place as a result of the Bologna process. There is no consensus on the purpose of the Ph.D. but the debate ranges between acquisition of the skills for the discipline and related research, versus training in research methods to equip students to become "researchers and scholars at the highest level; this implies a command of technique beyond that required for one piece of research" (p. 102).

In Germany, the formalities for study differ between Higher Education Institutions (HEIs) and disciplines. In England there is a strong tradition for orienting the university education and training for the student's personal development, rather than to the disciplinary requirements (Gellert, 1993, p. 35). Some institutions are beginning to consider and implement a training model that would offer a Master's level education with research methodology training, etc. Some are considering offering a one-year fulltime course or a two-year part-time

course to provide a path for students to advance in academic and professional status beyond the First Degree (p. 103).

Access to the supervising faculty member can be limited due to the availability or proximity of the individualized study conditions. In Germany, student numbers are increasing while faculty numbers are relative static, so professors are coping with the sheer numbers of doctoral students in need of supervision and undergraduates in need of teaching. As a result, the doctoral students may not be receiving the individual attention needed (Gellert, 1993). In the UK, access to the supervisor can vary by disciplinary model. For instance, students in a lab-based model will most likely have regular, if not daily, contact with their supervisor and have a group of students who are working on the same or related problems in the same lab. Students doing fieldwork may not have regular face-to-face contact with their supervisor, but will usually have some kind of regularly scheduled contact. For students in the social sciences or humanities, on the other hand, their research efforts are highly solitary and they may go for extended periods of time with no interaction at all with their supervisor.

More recently, regulatory research councils have recognized the importance of the supervisory role to timely completion of the degree (Green & Powell, 2007). Supervision is now moving toward a team model in which supervisors will be given some training, and the activities associated with supervising the doctoral students will be given credit and recognized a part of the professors' overall service to the institution. Additionally, they encourage

formalized selection processes, training, and assessment of those professors serving as doctoral supervisors (p. 99).

Regardless of access, there are other factors that determine the success or failure of the apprentice model relationship between supervisor and student. A lot rests on the supervisor's personal style.

> It was noticeable how often those interviewed justified their practice by reference to their own doctoral experience, modeling it on that of their original mentors, suggesting a craft tradition that operates in the absence of any formal training for the supervisor's role. (Becher, 1993, p. 128)

Becher reiterates that variation in the quality of supervision is inevitable when they receive no formal training and are chosen for the expert knowledge of the field rather than for their interpersonal skills (p. 146). Indeed, this lack of formal training was found to be present almost everywhere until recently (within the last five years or so).

Some broader support for students, depending on the size of the HEI, are graduate seminars or workshops designed for scholars who work in the same field, and research stables where scholars from a particular field "gather round them a group of up to a dozen students at various stages of progress' (p. 131-132). Here, similar to laboratory groups, a fairly close-knit group forms around their shared understanding of a specific field of inquiry. Additionally, attempts are made to introduce students to scholars from other institutions, provide attendance

at international conferences, and take opportunities for joint publication between supervisor and doctoral student where possible.

Early in the process, the supervisor is instrumental in helping the candidate define and narrow the dissertation topic as well as help determine the investigational strategies to be undertaken. Bounding the study and planning a timetable are critical activities that determine the course of activities in the ultimate production of the dissertation. Unlike the American model, the European apprentice model uses a solo supervisor design to protect the student from the possibility of ideological clashes between experts in the field who believe in differing paradigms with conflicting methodological approaches. This choice is based on the need for a unified and holistic treatment of the subject matter and coherence of approach (p. 130).

Doctoral candidates are considered early stage researchers who are at an advanced stage when they enter their research apprenticeship (sometimes called the Master/Slave model; (Becher, 1993). Their only objective is the contribution of new knowledge. They work under a solitary supervisor from whom they learn their craft; no committee is involved. Doctoral candidates are considered somewhere between a student and an employee and as such, are provided with healthcare, social security, and pension (full support).

In the UK, candidates are funded for up to four years, at which time the expectation is that their program should be completed (Henkel & Kogan, 1993; Becher, 1993). This provides for one year of preliminary training and three years' study to complete the dissertation; however, the government funders are pushing

for a three-year full-time period of research training. “Most academics agree that the scope of dissertations must be reduced if the three-year norm is to be achieved” (p. 103).

Due to pressures from funding agencies, European institutions are forced to make sure doctoral students complete their studies within this 3-4 year time frame or see university funding levels further reduced. At the present time the average time to degree in Germany is 3-6 years and the rates of completion are unknown. For the UK students who are funded under the Research Council (only 30% of the total doctoral student population) time to degree is four years and unknown for the rest of the doctoral population (Powell & Green, 2007).

The following is a description of the American model of doctoral study with some historical context and mention of some notable models.

American Model of Doctoral Education

The American model of doctoral education, established in the late 1800’s, finds its heritage in the rigid German model and its procedural minutiae (Schatte, 1977). The primary purpose of the original German Ph.D. was to supply the future professorate and so a primary part of the training was to amass teaching experience “enabling him to value the ability to communicate the knowledge he himself was acquiring” (p. 77). Later, the universities expanded the purpose of the Ph.D., and added to the philosophical dimensions of the training techniques of investigation and the scientific method. As a result of these additions, new traditions were developed that are still a part of American doctoral education today; seminars, laboratories, research institutes, scholarly/scientific associations,

scientific publication, colloquia, the principle of academic freedom, and rigorous scholarly disciplines (p. 77).

The original process for conferring of the degree was a multi-step process reminiscent of the requirements Ph.D. candidates face today. After the candidate had prepared himself for approximately seven years under the one-to-one tutelage of his supervisor, he followed a five step process to the conferring of the degree (p. 76):

1. After swearing obedience to the rector, the candidate declared under oath that he had fulfilled all statutory requirements for the degree.
2. Having received permission to proceed, he presented himself for examination before the college of doctors, he was given two passages randomly selected from the pages of two books of civil or canon law opened individually by each of two doctors.
3. The candidate then had eight hours, with the assistance of his supervisor, to prepare a lecture on each of the two passages. He then returned to the college of doctors to deliver the lectures and was submitted to questioning by those present.
4. Having passed the private examination and becoming a licentiate, he was presented with all pomp and circumstance for a less rigorous public examination where he presented himself

for the first time publicly as a doctor of a university to be questioned by the students.

5. The supervising doctor then presented the new doctor to the archdeacon who conferred a license to teach and the licentiate underwent the rite of investiture thereupon being conferred the degree of Ph.D.

The process followed in the journey to the American Ph.D., with some variations, remains quite similar to that of the 19th century German model described above.

Universities in America are autonomous and, as such, there is competition for the best students and for the best programs. Unlike other countries, the federal government does not provide all of the support for doctoral students – it comes from a combination of government support, industrial support (particularly in the sciences), and loans undertaken by the doctoral student (Gumport, 1993). Industrial sponsorship provides the opportunity for the doctoral student to be engaged in cutting edge research in state-of-the-art facilities with the potential of an employment offer at the conclusion of their studies. Industrial partnerships also benefit the university by sustaining the working environment and facilities with the most up to date equipment that would otherwise be a challenge for the university to provide (Gumport, p. 246). Social Science and Humanities students enjoy fewer funding options than others and frequently are forced to take out loans for their education.

Administratively, graduate education in America usually resides under the umbrella of a graduate college as an independent unit of the university. The graduate college oversees the training of all Master's degree students, doctoral education, and postdoctoral training for their particular university. "Graduate education programs are embedded within universities as a distinct layer resting atop undergraduate arts and sciences programs, usually drawing on the same faculties and relying on resources derived from an institution's teaching as well as research missions" (Gumport, p. 225). The graduate college is responsible for setting policies and procedures governing graduate education, monitors all graduate activities to focus on "access and equity, student retention and progress, time-to-degree, career development and doctoral educational outcomes (Nerad, 2007). The graduate college grants degrees, collects the dissertation, making sure that all requirements have been met, and approves any new graduate degree programs (p. 137).

Admission to doctoral studies is extremely competitive, especially in the sciences. Faculty members who admit students into their labs are usually guaranteeing them financial support for a number of years, so the fit is important.

> In general, US doctoral students have a fairly close relationship to their main dissertation adviser. In recent years much attention has been paid to the faculty/student relationship and mentoring has become the preferred model. A mentor, in contrast to an adviser, nurtures, protects, guides and socializes the student into a professional of their field. A faculty mentor plays an active role in

> the student's job search after degree completion. In short, faculty often take on a role beyond simply advising on program requirements (Nerad, p. 139)

Instead of an apprenticeship model, we follow a training model beginning with certain prescribed coursework to teach research methodologies and skills appropriate to the chosen field. Typically in America, we have a doctoral committee of three to five professors (sometimes with requirements that one be from outside the program under study). Generally speaking, the process usually encompasses five steps:

1. Coursework,
2. A series of exams, often called the general or qualifying exam,
3. A dissertation proposal,
4. An original piece of research (the dissertation), and
5. The public defense of the dissertation research (Nerad, p. 138)

Throughout the entire process, the student's doctoral committee is responsible for overseeing the work, ensuring that the student is making satisfactory forward progress to the degree, and assisting the student in developing their scholarly identity. Supervisor/advisors/mentors are critical during the process to ensure satisfactory progress and timely completion of the degree (Nettles & Millett, 2006; Hall & Burns, 2009).

Currently in the US, doctoral students in the natural sciences and engineering spend approximately five to seven years to obtain their Ph.D. For students in the humanities the time-to-degree is generally longer, six to 10 years.

The time is calculated from the date of original enrollment through the date of graduation with a doctoral degree. This time usually includes time spent earning a Master's degree along the way; a requirement of nearly every American doctoral program (Nerad, p. 138).

The American model of doctoral supervision/mentoring tends to preserve the status quo through the emulation by the new Ph.D. of the approaches taken by their own advisor/supervisor/mentor. Ideally, doctoral students have a continuing relationship with their advisor/supervisor/mentor throughout their journey toward their Ph.D. Subsequent to earning their degree, new Ph.D.s who remain in academia usually take a position as an assistant professor and begin to advise/supervise/mentor doctoral students of their own. Apart from rebelling against a poor advising experience, they tend to perpetuate the way in which they were advised/supervised/mentored (Amundsen & McAlpine, 2009). In addition, there is little or no training in how to guide doctoral students and very little collaboration between professors on best practices in these activities (Hall & Burns, 2009).

As a new academic developing into an established academic, there are many expectations placed on the new Ph.D. both within the institution and in the broader scholarly community with supervision of doctoral students being but one aspect of those duties (Amundsen & McAlpine, 2009). That is, supervision requires intense work with a student and (in North America) one or more other academics serving as committee members while at the same time attending to the expectations of the local community in which he/she works and the broader

scholarly community. …there is an ongoing clarification or repositioning of one's scholarly values and identity as, on the one hand, the supervisor supports the production of a quality thesis that will meet the expectations of the examination process and, on the other hand, supports the entry of the doctoral student into the broader scholarly community (Amundsen & McAlpine, 2009).

There is little, if any, professional development for supervisors. Pearson and Brew (2002) stress that what is important is not only reflecting on past practice, but reflecting critically on one's practice and the development of strategies based on theoretical frameworks derived from current literature on supervision. The concept of reflection in practice as developed by Schön is an important part of professional education and encourages the development of reflective habits over time and the practice of awareness of emerging new knowledge (Schön, 1987). Instead of focusing on institutional rules of procedure, and examination and research protocol requirements, professional development programs need to be designed to help the supervisor make their own appraisal of their supervisory and interpersonal communications skills and develop techniques to explore the student-supervisor relationship for the benefit of both. A number of studies (Pearson & Brew, 2002; Dowie, 2008; Pearson & Kayrooz) recommend that like other teaching practices, supervisory practice should be evaluated and assessed from both the supervisor and the doctoral student perspectives. One of the instruments used in the present study provided just such a vehicle.

Not only should there be accountability for practice of supervision, but doctoral students need to be accountable for the development of their own

professional or scholarly identity. An interesting model for doctoral education as a type of cohort model comes from Auburn University's educational leadership doctoral program. The Doctoral Education Leadership Seminar (DELS) has matured into "a leadership laboratory where members turn theory into practice (Bentley, et al., 2004). Wenger (2006) calls this type of community of practice a group of individuals whose membership in the community is a commitment to a group whose identity is defined by a shared domain. Certainly, that is what the DELS represents.

The cohort was originally devised in 1989, but the current format of the program came about as a result of a thorough evaluation of the students' doctoral experiences in 1998. The DELS is now a required part of the core curriculum for all doctoral students in the Education Foundations, Leadership, and Technology Department (p. 39). Cohorts begin the series of doctoral seminars as a group approximately three times a year. Once a member of the cohort, the students form a group who experience the program of study together from beginning to end.

"Within the cohort, students are not just receptacles of knowledge they are interdependent team members that are creators of knowledge (p. 40). The group actually transitions from a group of students to a team with a strong sense of common identification, common goals, and "begin to envision personal growth as best achieved through high task interdependence …they solidify into an interdependent team of mutually supporting friends and colleagues (p. 40). The unusual structure of the model is why I am presenting it here. The authors, who experienced the cohort themselves, present it as a series of metaphors to describe

the structure. Additionally, I present this model is because it is not limited to any particular discipline. It is a structure that could be employed for any doctoral program.

The authors present the model from four frames based on Bolman's and Deal's (1993) four leadership frames: political, structural, human resource, and symbolic. From the standpoint of the political frame, the professor is initially the ultimate holder of power in terms of the authority to award a desirable final grade; however, the relationship changes to a power among equals relationship as the professor empowers the students to "also be professors and mentors to the group and to rely on and share their own personal experiences, values, and beliefs to enhance the group's understanding about a wide range of educational and leadership topics. …the professor is, metaphorically, "the tour guide", not the king or queen of the class (p. 40).

Structurally, the group starts out with a specific framework delineating the goals, time and date for the initial meetings, and assignments and tasks. But the framework quickly moves to a negotiated frame as "individuals within the group take on specialized roles to coordinate with outside agencies so that meetings can be held in special off-campus locations that enhance learning, sharing and socialization" (p. 41); a community where the talents of all are encouraged and multiplied by combination.

In consideration of a human resources frame, the metaphor becomes siblings in a family. Each member of the group creates their own autobiography and artifacts to share with each other as they learn each others' strengths and

weaknesses. They learn to share honestly among the group when it comes to feedback and practice journaling and reflection shared with the group. The group establishes a peer-mentoring system to facilitate personal and professional growth and goals. They become a never-ending social support network for each other.

Finally, in a symbolic frame they become a collaboration of comrades in charge of and furthering their growth as scholars and friends. The authors report that through social gatherings and a shared community project lasting bonds are formed that create lifelong connections. They eat together, have socials together, learn together, assist the community together, and even take trips together. Some cohorts even go so far as to create a logo so that they can proudly wear tee-shirts proclaiming their membership in "an evolution of structure that will influence how and where they make their contributions to the community, to the family, and to their friends" (p. 43). Finally,

> The cohort is not just a class, it is a relationship. It is a relationship among key stakeholders on a knowledge expedition with expert tour guides; it is a relationship among key interlocking and specialized pieces of a three-dimensional puzzle; it is a relationship of siblings with a common desire to see their family succeed; and, it is a relationship of lifelong friends engaged within a community of lifelong learners (p. 44).

This is a model that is not discipline-limited. It is an empowerment of the doctoral students to work together to claim their destiny and celebrate their success. Their professors are still vital to initiating the collaboration, but the sense

of themselves as unique individuals with special knowledge and experiences together creates a knowledge community with lifelong leverage to succeed.

In the next section I describe the Australian model for doctoral education with some historical context along with some innovative models. Following, I make a comparison with the American model just described.

Australian Model of Doctoral Education

The Australian model of doctoral education is very similar to the European model. The undergraduate study years are very discipline focused so that by the time a student begins doctoral studies, there is less, if any, discipline focused coursework (Evans, 2007). The government is the primary funder of fulltime doctoral students. Therefore, they have a vested interest in making sure that doctoral students complete in a timely fashion. "As a consequence of both the discipline-focused undergraduate education and four-year funding for doctoral tuition, doctoral education programs are shorter and more discipline-focused in Australia than the USA and about the same length as in the UK" (Evans, p. 120). As of 2007, the average time to completion was 5.5 years (for all commencers) and approximately 53% completed their program and were awarded the Ph.D. (Powell & Green, 2007) doctoral students in Australia are referred to as Higher Degree by Research (HDR) students.

In 2001 the Australian government made a significant change to the way in which they allocated funding to universities when they implemented the Research Training Scheme (RTS). Instead of allocating funds for HDR students upon enrollment, they changed the funding awards to be allocated to the

universities upon completion by the HDR. According to Evans (2007), the objectives of the RTS were to:

- Enhance the quality of research training provision in Australia;
- Improve the responsiveness of institutions to the needs of their students;
- Encourage institutions to develop their own research training profiles;
- Ensure the relevance of the degree programs to labor market requirements;
- Improve the efficiency and effectiveness of research training.

In 2006, the government introduced the Research Quality Framework (RQF) as a new phase of quality assurance and a modified funding allocation formula that continued these RTS policies and provided some additional mandated quality assurance requirements institutions must meet to ensure continued HDR funding (Evans, 124).

Supervision of an HDR in Australia is handled by a primary supervisor who is an expert in the student's chosen discipline, holds a doctoral degree, and has "sufficient time and resources to provide a quality learning experience for the candidate, and have training or experience in the supervisory practice" (Evans, p. 131). Due to quality assurance mandates of the government, many institutions in Australia now have training programs for supervision of graduate students. Each university is accountable to the government to show that they have measures in place to assure appropriate supervision to completion. In addition to the primary

supervisory, he/she may be assisted by a colleague or colleagues to form a supervisory panel; however, they may fill very different roles than the primary supervisor. In any case, none of the supervisors participate in the assessment of the thesis and awarding of the Ph.D.

Completion of the Ph.D. in Australia is based on an external examination of the research thesis with no oral examination. At least two of the examiners must be from outside the institution (Kiley, 2009). This is a major difference between the Australian model and the American model. When the first Ph.D. was offered in 1946 in Australia, it was essential to have the work assessed externally, meaning out of the country, "as that is where many of the 'experts' of the time were researching" (Kiley, p. 33). The practice remains in place today even though the experts are no longer external to the Australian universities. Making the case for external examination is the argument that it is a way to market outstanding candidates not only to other universities, but to potential employers who may also be qualified to participate in the assessment process. In fact, "most Australian universities seek to include at least one overseas examiner where appropriate" (Kiley, p. 37).

Following the implementation of these quality assurance policies and the strengthening of the independent Australian Research Council, a flurry of research on postgraduate education was produced. In 2004, an analysis by the Research Evaluation and Policy Project (REPP) for the Australian Research Council (ARC) released a report, "ARC-supported research: the impact of journal publication output 1996-2000." This report established a baseline for publication

output prior to the implementation of Australia's new policies. In 2009, ARC released a new report, "ARC-supported research: the impact of journal publications output 2001-2005." In part, the authors report an increase in publications linked to ARC funding of 41% since the first publication in 2004, "well over twice the total Australian and world growth" (Butler, 2004). The report also cites increased collaborative research, both nationally and internationally, as well as an increase in multiple authorship within the same institution – all significant changes for Australian higher education compared to the baseline 2004 report.

Because postgraduate supervision was deemed to be crucial to the successful implementation of the government-mandated changes to research and research training, much of the resulting research grew up around the subject of postgraduate supervision and mentoring.

Perhaps one of the more innovative and comprehensive programs developed comes out of the University of Sydney named *University of Sydney Postgraduate Supervision Development Programme* (Brew & Peseta, 2004). In an article entitled "Changing postgraduate supervision practice: a programme to encourage learning through reflection and feedback," the authors describe the program and how it benefits the professional development of postgraduate supervisors. The university has developed an online set of modules, similar to the Human Subjects Training required by our IRB, that supervisors can access and complete at their own convenience and to the level of participation they choose.

The program has been developed to address the needs of supervision at all levels from beginning supervisors to the most experienced.

The article describes the program as follows:

> There are six 'Supervision Modules,' each taking a minimum of an hour and a half of independent-study time. These are organized around six stages of supervision: Preparing for Supervision; First Meeting; Managing the Process; The End of Year Review; Helping Students with Writing; and Completion of the Thesis. The modules (each of which includes trigger material and activities to assist supervisors in fully understanding the issues) aim to develop supervisory skills and supervisors' ability to manage the process. These modules can be accessed as a coherent program or separately as modules to address particular needs and interests.

In recognition of the need for an assessment tool that could provide evidence of learning to justify the conferring of Graduate Certificates to supervisors in the program, the authors developed an additional module, the Recognition Module. It was designed "for supervisors to consolidate, reflect on, and demonstrate shifts in their thinking about postgraduate supervision" (p. 9). In it, supervisors are asked to develop their own case study of supervision that would illustrate and reflect upon their learning as they completed the modules of the program. The authors designed the process to provide continuous feedback over the course of the case study development.

The authors clarified their vision in the following excerpt:

> Our purpose in developing a case study framework to underpin the Recognition Module was to provide supervisors with an opportunity to perform scholarly and reflective work on themselves as teachers, and to encourage them to see their own supervisory acts as educational inquiry in the form of professional development. In other words, we believed that the pedagogical strength of a case study approach lay in the simultaneous acts of writing, thinking and reflecting on the ways supervisors made sense of their supervision.

Feedback for those participating in this process is provided through a workshop environment where they can interact and share ideas with other supervisors who are developing the case studies and through direct feedback from the authors. Upon conclusion, the case studies become immediately available for use by postgraduate supervisors who want to learn and improve their skills in postgraduate supervision.

Of course, a program of this type would never be successful without full support at the institutional level. The modules were developed in response to the institutional agenda for the University of Sydney and as a result of the government mandates that funding would be (at least partially) dependent on successful and timely completion of the degree. The program has challenged participants to re-think their supervisory practices and challenge themselves to

develop their own practice rather than just duplicate or react against the experience of their own supervision during doctoral training.

Modifying the American Model toward a More Explicit Doctoral Pedagogy

Barring the existence of a government mandate in the United States and institutional buy-in to the innovative practices being developed in the Australian model, moving toward a more explicit doctoral pedagogy may have the potential to increase completion rates and, perhaps, emulate some of the positive outcomes they have experienced.

Much of the Australian research examined the importance of postgraduate supervision to successful completion of the Ph.D. as well as the widespread lack of training to be an effective supervisor. Becoming a doctoral supervisor is a process that begins with the attainment of the new academic's own degree and develops over the course of his/her own professional or scholarly identity development. Usually the only training they receive is that of their own experience of being supervised as a doctoral student. "We suggest that there is a need to re-conceptualize the experience of pre-tenure academics as a continuation from doctoral student through to more established academic and to situate supervisory experience within the broader development of academic practice (Amundsen & McAlpine, 2009)."

Pearson and Brew (2002) in "Research Training and Supervision Development," go on to say:

> The importance of supervisors developing a repertoire of knowledge and understanding about different aspects of

> supervisory practice cannot be too strongly stressed. If the supervisor is to be effective, it is necessary for them to be capable of carrying on a critical conversation about supervision itself with colleagues and with students. This conversation will also need to encompass a critical appraisal of the supervisor's interpersonal and communication skills. This requires the supervisor to be open to gaining critical feedback on their skills and performance as coaches and mentors.

The relationship between a postgraduate supervisor/advisor/mentor and their doctoral student is virtually the same as that between an expert mentoring teacher and the pre-service teacher. Doctoral students count on being able to observe the expert researcher and academician in action to develop their own scholarly identity.

> Supervision requires an appreciation of students' learning and a respect for the emotional attachment they have to their study. Helping students to make sense of their experiences, to relate theory to practice and to develop thorough understanding and enquiry is a major responsibility. (Dowie, 2008)

Thus, though much literature suggests the importance of the relationship of postgraduate supervisors and their students for successful degree completion, not much exists in the way of training and assessment of supervisory practices. Some models have been developed such as the *Supervisor/Student Alignment* Model (Gurr, 2001), and *The Reflective Supervisor Questionnaire* (Pearson & Kayrooz,

2004) designed to enable critical reflection on supervisory practice "as a facilitative process involving educational tasks and activities."

In the next section I discuss identity theory, social identity theory, and the salient hierarchies of multiple role identities as they relate to the process of doctoral training.

Scholarly Identity Development

A recurring theme within Australian literature, as well as literature from other parts of the world, is identity development; specifically, development of the scholarly and research identity as it relates to doctoral education. This process of developing the role identity of an academic scholar is addressed by Marian Jazvac Martek in her Ph.D. thesis, "Emerging Academic Identities: How Education PhD Students Experience the Doctorate" (2008):

> With respect to doctoral students, academic role identities are more prominent when students feel this particular role is supported by others, when they make a firm commitment and investment to this role, and they experience both internal and external rewards of this role that further promote investment and support from others. In everyday events and interactions, the salience of particular academic role identities versus particular doctoral student role identities are determined by how much the person may need that particular role supported, the need for the rewards associated with that role and the opportunities that present themselves for acting this role. Enacting 'academic role identities' can be difficult for the

> doctoral student because they are simultaneously trying to take on appropriate 'doctoral student role identities' while they are transitioning from the role of student to academic (p. 35).

Identity Theory and Social Identity Theory. While Identity Theory and Social Identity Theory have many similarities, there are some clear differences between the two particularly in the way that individuals define their identities. In Social Identity Theory an individual identifies categories or groups with whom they identify. Their concept of identity is defined by affiliation with a particular group in contrast to affiliation with another group (in-group versus out-group; Stets & Burke, 2000). In Identity Theory, on the other hand, an individual identifies with a particular role along with the expectations and meanings inherent in that role. While a group identity in Social Identity Theory is defined by group membership and the individual sees their role definition from a group perspective, a role identity encompasses the meanings derived from the expectation of the particular role functions within its social construct (i.e., the role of doctoral student within a particular program). Both identity theories view the self according to the meanings imparted by the structural society around them, but only Identity Theory goes beyond group membership to the intricacies of negotiated responsibilities in relation to other actors in the social structure (Stets & Burke, 2000). So, for the purpose of this discussion, we will consider the doctoral student identity development from the standpoint of role identities.

For purposes of this discussion, identity will refer to the differentiated parts of the self that is composed of the meanings an individual attaches to the

multiple roles they fulfill across different social contexts (Stryker & Burke, 2000). Because the activated role identity depends on social context, an individual possesses many role identities at once and activates a role identity based on the expectations of the current context in negotiation with other individuals and their role within the group. For the role to function within the particular group it is dependent on reciprocity and exchange in relation to other individuals in other roles.

Unlike social identity theory where individuals identify themselves as similar to those in the identified group, role identity individuals do not consider themselves similar to the other members of the group; they view themselves as individual players with their own interests, responsibilities, and resources who negotiate with the individuals in other roles to determine role expectation, actions, and meanings (p. 227).

Salient hierarchy of role identities. Salience of a role identity is the probability that an identity will be activated in a particular social situation (Stets & Burke, 2000; Stryker, 1968). There are two conditions that affect the salience of an identity. The first is the number of persons to whom the individual is tied in this role, and the second is the strength or intensity of his/her ties to the others in the group. Each individual possesses a number of discrete identities comprised of the different roles they play in their life and as such, they exist within a hierarchy of salience from most to least likely to be invoked by the individual in a given situation (Stryker, 1968).

> In general, the hierarchy of salience becomes important in the prediction of behavior in the event of what may be called structural overlap, that is, when analytically distinct sets of relationships are mutually contingent at some point in time and so do invoke concurrently different identities. (p. 560)

In our context this structural overlap might occur when a Ph.D. student is supplementing their education as a TA teaching undergraduate students; in this situation the student's teacher identity will be in an overlap with her Ph.D. student identity and whichever identity is activated will depend on that particular identity position in the salient hierarchy give the current circumstance and social situation. If the TA is being observed by her Ph.D. supervisor in the classroom, even though she is teaching, it may be her Ph.D. student identity that is activated from the salience hierarchy of her multiple identities.

Identity development in doctoral training. While the development of the academic identity is a major objective of doctoral training, doctoral training as it relates to the emergence of the academic scholar has not been a primary focus in research on doctoral education. "The emerging identities of doctoral students are only alluded to or left out entirely in this growing body of research" (Jazvac-Martek, 2009). Some research uses a socialization model to study Ph.D. student development in the process of acquiring the training, attitudes, beliefs, research capacities and academic identity to function in their profession (p. 254). Doctoral students gain these capacities through a lengthy process of learning research methodologies, observing and emulating their faculty advisor in the process of

doing research, interactions with other faculty members in professional contexts and learning from more senior graduate students along the way. By using the notion of role identity development for scholarly identity development we can "invoke a more active awareness of emotional, cognitive and social repertoires embedded in practices, and may better delimit the intermediary character of doctoral education (Jazvac-Martek, 2009).

Many doctoral students take on the role of teachers, novice researchers, and apprenticed academics in an effort to learn the norms and values of an academic role within a specific discipline. They construct their identity based on the observations of experts in action and look to their supervisor/mentor and other members of the profession to verify their newly evolving identity as an academic. As they receive more affirmation of their activities, and they rise to new expectations, their self-efficacy in the role grows and the salience of that identity rises to the top of the hierarchy of identities possessed by the doctoral student. "Without the mediation of others, specific role identities are difficult to acquire; socially mediated interactions are an innate part of the emergence of academic identities" (Jazvac-Martek, 2008). With increased affirmation by colleagues, comes greater commitment to the newly emerging academic identity.

For doctoral students to see themselves as academic professionals, faculty and administrators can "foster integration of doctoral student's teaching, research, and service identities by creating cultures in their doctoral programs that elucidate shared meanings across the various aspects of academic work (Colbeck, 2008) building identities that will prepare them for future teaching, research and service

as an academic professional. It is through this socialization into the community that doctoral students begin to develop an identity as a scholar and a researcher.

Community can be a powerful force as a builder of scholarly identity. With a community there comes a culture of shared beliefs, actions and methodological approach to inquiry; an epistemology of the prevailing paradigm. As a community, members create new professors in their own image. "Although researchers may, over time, gain reflective distance on the epistemological structuring of a research enterprise, the power of that enterprise remains a significant force in the academic career" (Neumann & Pallas, 2006). As Thomas Kuhn told us in *The Structure of Scientific Revolutions,* it takes a revolution to produce a shift in a paradigm (Kuhn, 1996).

Under certain circumstances, a doctoral student plays a much more active role in authoring their emerging scholarly identity, a sort of ecological undertaking; however, role identity is still relational and depends on the interactions with others in the group functioning through their own roles, perceptions and resources (and, perhaps, power). "One of the complications of an ecological view of identity development is represented in our use of the terms such as "others," "relationships," and "communities" – the idea that identity is somehow negotiated between self and persons existing beyond self" (Neumann & Pallas, 2006); however, how an individual sees him/herself in the context of their social and cultural worlds assists in making sense of one's own life and, therefore, contributes to the emerging scholarly identity.

Doctoral Training as Pedagogy

In building capacity as an autonomous researcher, it is not a matter of tapping into a set of innate abilities and capacities. A certain level of ability may be innate, but a set of capacities can be taught (Johnson et al., 2000). Every day researchers are faced with new challenges to solve that involve new modes of knowledge production. Researchers today are faced with learning new methods, learning to work across disciplinary boundaries, and learning to recognize the contribution of others rather than solely their own. "The supervisor no longer needs to be 'master', in whatever guise, but a teacher of particular skills, ways of thinking, and writing. (p. 145).

In the process of building that academic identity, the doctoral student learns how to integrate research skills to improve teaching and learning for his/her students, to construct penetrating inquiry that advances his/her research agenda, and to define, analyze and solve complex interdisciplinary real-world problems in partnership with students, interdisciplinary colleagues, and relevant industry professionals (Colbeck, 2008). Since we know that very few Ph.D. students approach their faculty members to specifically ask them about life as a professor (Bieber & Worley, 2006), and rarely do experts (Supervisor/Mentor Professors) "verbalize their thought processes, so the student can observe and build a conceptual model of the process required to complete the task" (Pearson & Brew, 2002), how must this emerging academic identity be communicated to Ph.D. students?

Some experts suggest that a model of Cognitive Apprenticeship (also known as coaching) be employed to more thoroughly train the doctoral student through a more explicit pedagogy to facilitate the development of scholarly identity (Pearson & Brew, 2002). This type of coaching model could also include the Ph.D. student "shadowing" the faculty member in the performance of their academic responsibilities (including teaching, research, and service duties) to build a better expectation of their own future duties in the profession. Hall and Burns, in *Identity Development and Mentoring in Doctoral Education* (2009), posit the following:

> Successful mentoring toward identity formation in doctoral education requires more than course sequencing and selecting the "right" texts; it requires ongoing dialogue and constant revisions that attend to the needs of faculty and student agents in a given program's figured world. We argue that professionals must go beyond simple curricular consideration of content, assessment, and outcomes to think of curricula as projects of human inquiry.

Doctoral students share many similarities with pre-service teachers. During the first years, students are exposed to theory, research methods, and, if they are members of a laboratory, direct research experience under the direction of an expert in their field. But how much does one really learn through observation alone? Research has shown that experts possess tacit knowledge not obvious even to themselves unless they are forced to think through and speak through their thought processes. Their decisions and actions, when the level of

expert is attained, become so automaticized that simple observation is inadequate to inform the practice of the novice under such tutelage (Schön, 1987; Bransford et al., 2000; Dewey, 1933). Experts evaluate problems and organize knowledge more efficiently than novices and recognize patterns not yet apparent to the novice. Experts have extraordinarily fast and accurate pattern recognition capabilities that lead to activation of schema and the reduction of cognitive processing loads (Berliner, 1986).

Ruth G. Ethell and Marilyn M. McMeniman in *Unlocking the Knowledge in Action of an Expert Practitioner* describe an intervention designed to "examine and make explicit the typically tacit understandings of both beginning and expert teachers" – equally applicable to beginning and expert researchers. They "brought together the stimulated recall of an expert teacher's thinking and the collegial reflections of a group of student teachers" (Ethell & McMeniman, 2000).

They utilized a model incorporating Schön's *reflection-on-action* (Schön, 1987) to reveal the tacit knowledge of the expert to novice teachers. The researchers used a cognitive apprenticeship learning model to give students "the opportunity to observe, engage in, and invent or discover expert strategies in the context of their eventual use."

They video-taped an expert secondary school teacher, Ivan, teaching a number of classroom lessons. Following each lesson, the researchers performed a stimulated-recall interview with Ivan regarding the lesson to ascertain the explicit thinking processes, theories, and pedagogical approaches that informed and guided the lesson activities. Prior to the stimulated recall interview, Ivan

articulated the objectives and intentions for each lesson and talked about the specifics of preparation undertaken prior to the lesson. The actual video-taped lesson was used during the interview and was stopped and started as needed to allow the researchers and teacher to examine the thought processes and actions in great detail. Two products resulted from these activities, a video recording of Ivan's delivery of the lesson in the classroom and a recording of his stimulated recall of the "thinking and intentions underlying his classroom practice, evidence of Ivan's knowledge in action."

Subsequent to the production of the video recordings, novice teachers were guided through a workshop during which they viewed the delivery of the lesson and were encouraged to reflect upon their observations of the lesson and speculate about the teacher's classroom practices and pedagogical theories they observed. Then they were asked to compare and contrast their own practices and theories with those of the expert. Once they completed those steps, they had the opportunity for a collegial discussion among themselves to talk about their personal theories and practices.

Finally, the novice teachers observed the video-recording of the stimulated-recall interview that included Ivan's reflections on his practice. They were then asked to identify Ivan's teaching practices and curriculum theories as well as any theories of learning he expressed during his reflection on the lesson. Finally, they were asked to compare and contrast their inferences from observing Ivan's teaching, their own personal theories, and Ivan's explicit reflections as detailed in the stimulated-recall video.

Through the workshops, the participants began to realize that merely modeling behavior that seems to work in the classroom does not add to their understanding of the thinking underlying the actions of an expert teacher.

> The participants' final understandings and appreciation of Ivan's teaching theories and objective (Step d) differed significantly from their interpretations after they had merely observed his teaching. Participants recognized that observation of teachers' practice, even *expert practice*, was inadequate as a means of learning to teach, as it relied on the student teacher *guessing* the underlying intentions of the role model (p. 94).

It is my position that novice researchers are at the same disadvantage as novice teachers in developing their scholarly and research identity through observation alone. There is a need for explicit pedagogical attention to the development of the scholarly and researcher identity that needs to involve discussion of the underlying thinking, intentions, and knowledge construction approaches employed by the expert researcher and scholar.

The Council of Graduate Schools (CGS) Ph.D. Completion Study (2004) identifies a list of institutional factors that may hold promise for innovative solutions to the problem of Ph.D. completion. They are Selection, Processes & Procedures, Research Mode of Field, Program Environment, Financial Support, and Mentoring. For her 2001 study, *Leaving the Ivory Tower*, Barbara Lovitts found that the relationship between the supervisor and their advisee was so critical to degree completion that she devoted an entire chapter to the relationship. Her

study found that having an advisor was so critical to understanding and getting through a doctoral program that non-completers were seven times more likely than completers to report that they did not have an advisor (23% to 3%; p.132).

Further, Lovitts found that there were generally two types of advisors; high producing advisors (HP) and low producing advisors (LP) with characteristics associated with the two categories that affected student completion and satisfaction with their graduate school experience. Students of HP advisors in her study had a greater quantity of academic interaction with their advisors, they felt their advisors took a greater interest in them as individuals, were more interested in their research ideas, and were more supportive of their development as professionals. HP advisors were three times more likely to encourage their students to join professional associations and foster the networking their students would need for future advancement as a professional. Conversely, LP advisors rarely talked about these issues with their students.

So where does advising stop and mentoring begin? According to Rose (2005) mentoring relationships, while encompassing the essential roles and function of being a reliable information source, department socializer, advocate, role model, and occupational socializer, go a step further and are characterized by a "mutual emotional investment that develops naturally and spontaneously and cannot be legislated." Lovitts (2001) found that HP advisors were more likely to provide this kind of support to their students. They reported that they initiated interactions with students and were more likely than low LP advisors to refer to their students as friends. In fact, not a single LP advisor referred to their students

as *friends*. HP faculty are more likely to be involved in the social activities and are "more likely to take the initiative to instigate and sustain social interaction than LPs" (p. 156).

Some students are assigned an advisor and may have little or no choice in the matter. Others are not aware of the option to choose their advisor, nor do they know how to go about doing so. Others make a mutual selection between advisor and student based on some aspect of common research interests or personal interaction. In the conclusion to her chapter regarding the quality of the advisor-advisee relationship, Lovitts states:

> Students who work with advisors by mutual choice are more likely to get the advice and guidance they need to progress smoothly through their programs and into their careers, to be academically and socially integrated with their advisor, to be very satisfied with the relationship, and to complete the Ph.D. than students who have little or no say in the matter (p. 164).

So, how can the quality of advising be improved to retain more Ph.D. students who will complete their degrees? What is the role of self-efficacy and human agency in the process? What about development of the scholarly and researcher identity in the context of graduate study? Are advisors adequately prepared? How is the appropriate advisor paired with the doctoral student? What can institutions do to better leverage this relationship into successful completion of the doctoral studies?

Boyer's Four Domains of Scholarship

In 1990, Ernest L. Boyer, in a special report for the Carnegie Foundation for the Advancement of Teaching, urged that the dominant view of scholarship, consisting primarily of research and publication, be reconsidered to more broadly include the full scope of scholarship performed by the professorate. In his report entitled *Scholarship Reconsidered: Priorities of the Professoriate,* he advocates for the inclusion of Scholarship of Application, or engagement both within and outside the educational institution; Scholarship of Discovery, research and the discovery of new knowledge; Scholarship of Integration, also known as interdisciplinary collaboration; and, Scholarship of Teaching, with more effective teaching (foster learning in the classroom), scholarly teaching (assessment of practices for continual improvement), and scholarship of teaching (journal presentation/publication for peer review; Austin & McDaniels, 2006, p. 52-53; Boyer, 1990, p. 2). Taken a little more broadly, one might see a parallel with some of the design aspirations that make up the vision of ASU's New American University; namely, Community Embeddedness, Use-Inspired Research, Intellectual Fusion, and Enable Student Success (through high-quality teaching practices).

> Historically, however, doctoral programs have not emphasized opportunities to understand how the various forms of scholarship have played a role in the particular missions and societal contributions of each institutional type. Attention to these issues

> would enrich graduate preparation (Austin & McDaniels, 2006, p. 55).

Austin and McDaniels urge institutions to assist doctoral students to develop foundational competencies in the areas of understanding the mission of higher education, developing a professional identity as a scholar, developing interpersonal skills both orally and in writing for a broader audience, ethics and integrity in the responsible conduct of research, and intellectual competencies to include framing appropriate questions, designing and implementing the scholarly project, presenting results, and receiving feedback and evaluating the work of others (p. 56-58). They go on to recommend strategies to include modeling, informal and formal conversations, formal professional seminars, internships, and certificate programs (p. 60-61).

> This concept might be expanded to include requirements that encourage students to conduct research on the teaching and learning processes in the classroom and develop appreciations and competencies needed to work in all four domains of scholarship (p. 61).

They further suggest that a conceptual framework be developed to explicitly prepare graduate students to take part in the four domains of scholarship. Assessments could then be designed to investigate whether students are being adequately prepared to take part in the community of scholars. "The data from such an assessment would help institutional leaders… understand where

the gaps or weaknesses exist in the preparation provided to doctoral students for their careers" (p. 62).

And finally,

> The greatest challenge may be long-standing traditions within some disciplines about how doctoral students should spend their time. Strong leadership and thoughtful conversations led by those who understand the importance of preparation for different kinds of scholarship may be the most effective way to address this challenge. Such efforts will ensure the excellence of tomorrow's faculty, preparing them to sue their expertise to engage creatively in the scholarships of application, discovery, integration, and teaching (p. 63).

And I would agree that we should move "Toward a More Explicit Doctoral Pedagogy."

Conceptual Framework

The hallmarks for the completion of the Ph.D. degree consist of development of deep expertise in a particular discipline or profession, development of a scholarly and researcher identity, and contribution of new knowledge as a result of original research. With completion rates hovering at approximately 50-64%, depending on the discipline, attention must turn to those practices that can make a difference in completion of the degree. To that end, this study attempted to examine the relationship between the doctoral student and their

supervisor. In particular, how the relationship is critical to the development of the scholarly and researcher identity.

In the case of doctoral education, identity formation consists not only of individual efficacy as a researcher, but membership in a disciplinary group (Stets & Burke, 2000). To develop this identity, doctoral students affiliate themselves with their supervisor in a cognitive apprenticeship (Ethell & McMeniman, 2000) to learn how to be a researcher, how to become a member of the discipline, how to think critically, and how to produce new knowledge; however, as we have seen, these skills are not developed through observation alone. The novice must have an understanding of the tacit knowledge possessed by their mentor to develop their own researcher identity. One of the ways this type of knowledge can be conveyed is through reflection-on-action (Schön, 1987) during the process of doctoral education. This requires open communication and, specifically, new pedagogical attention to this process of identity development during doctoral education.

Two key components of the study were to evaluate the construct validity of the Ideal Mentor Scale (IMS) and to understand the lived experience of the mentoring relationships between doctoral students and their mentors. I sought to understand the particular experiences and emic perspectives as well as the general constructs and processes. Reality is complex and social so that the addition of a qualitative component to the study design enabled me to serve a broader set of interests in the resulting assertions. I sought validity through coherence across multiple lines of evidence (Smith, 1997).

Researcher Perspective

I began graduate school in 2001, admitted to my Ph.D. program right after earning my B.A. I completed my coursework in 2006 and spent most of my time working; finally completing my M.A. in 2008. My mentor moved to a different state and I spent a year making no progress at all. After some introspection and self-examination, I realized that I had to pull myself up and move forward. This experience, and my involvement with the Council of Graduate Schools (CGS) Completion Study, has made me intensely interested in studying Ph.D. completion and attrition and the factors that contribute to each.

Although I did not expect to be acquainted with any of the participants in this study, I did expect to have an understanding of the experience of pursuing the doctoral degree. It was impossible for me to be absolutely objective, but I did expressly try to understand the individual experiences from their perspective as revealed by the participants in the study. I strove to understand the particular meanings in action of their individual context. I realize that there are multiple realities as interpreted by each participant, but I made every attempt to understand and interpret them as accurately as possible. While my own experience of the doctoral process cannot be completely ignored, I made every effort to remain aware that it may influence my interpretations of the data and have eliminated bias to the extent possible.

My experience participating in the CGS Ph.D. Completion Study, my own doctoral experience, and my experience evaluating a number of interdisciplinary doctoral training programs at ASU has made me uniquely qualified to conduct the

study. I have been trained in both quantitative and qualitative methods used for this study, and feel confident that I have made a thorough examination of the resulting data corpus.

Pseudonyms have been used in this account of the data from the study and, where necessary, description of program details has been written in such a way as to disguise the actual program identification without compromising the findings. In addition to interviews of the doctoral student, I conducted interviews of the graduate directors or graduate staff members for each of the doctoral programs in which the students were enrolled.

In the following chapter I describe the method used for gathering data for both the quantitative and qualitative components of the present study. I first describe the components of the quantitative method including a description of the IMS, data collection for the IMS, followed by the participant description and analyses for the IMS data. Second, I describe the instrument used to initiate the qualitative component of the study, the QSDI, followed by a description of data collection for the QSDI and semi-structured interviews. Finally, I describe the participant description, chronology of the qualitative component, and analyses of the semi-structured interview data.

CHAPTER 3

Methodology

This was a two-component mixed-methods study designed to understand the key constructs and processes underlying the mentoring relationships between doctor students and their mentors. Participants in the quantitative component filled out the Ideal Mentor Scale and provided demographic information. The demographics were used to determine who would be invited to participate in a second survey designed to examine the lived relationship with their current mentor. Participants in the second survey would also participate in semi-structured interviews designed to elicit qualitative, comprehensive insights into the key constructs and processes of the mentoring relationship.

Two instruments were used in this dissertation study. The first is outlined in the article by Gail L. Rose, (2003) *Enhancement of Mentor Selection Using the Ideal Mentor Scale* (IMS). I received email permission from Dr. Rose to use the instrument with proper credit. The second measure chosen, by Mainhard et al., (2009), is described in the article, *A model for the supervisor-doctoral student relationship* and is called *Questionnaire on Supervisor-Doctoral Student Interaction* (QSDI).

The Quantitative Component of the Study

Instrument: *Ideal Mentor Scale*. The scale of interest, the IMS, is a self-report questionnaire. The researcher, Gail L. Rose, set out to make a "psychometrically sound measure of the mentoring preferences of doctoral

students" (Rose, 2003). There were five steps in the construction of the final scale. Table 1 shows the number of items at each phase of scale construction.

Table 1

Number of Items Comprising the Ideal Mentor Scale at Each Phase of Its Construction

Phase of Construction	Number of Items
Content validation	50
Focus group	135
Pilot (Sample 1)	111
Sample 2	103
Sample 3	76
Final	34

First, Rose constructed an item pool of 50 items that were constructed to represent Anderson and Shannon's (1988) five functions of mentoring: teaching, sponsoring, encouraging, counseling, and befriending. Rose believed the model to be the "clearest and most specific articulation found of the definition of mentoring" (p. 477). Once the pool of 50 items was constructed, Rose sought volunteers to review the items for content validity. The volunteers had specific knowledge of graduate education or mentoring. Each item was classified according to the five functions of mentoring specified in Anderson and Shannon's (1988) theory: "Eleven items with less than 87% agreement (as indicated by kappa coefficients) were revised to improve their representation of the intended function" (p. 478).

The second step employed graduate student focus groups (2) to evaluate the resulting pool of items. The first focus group recommendations expanded the

pool by adding 85 items based on other descriptions of mentoring from the literature and "the following personal characteristics of mentors: demographics, professional conduct, personality attributes, and relationship qualities" (p. 478). The second focus group was made up of graduate students from a different university from the first group. This focus group eliminated 24 of the 135 items based on redundancy of the item or its appropriateness for the topic. This resulted in a scale of 111 items ready for pilot study. The IMS was administered sequentially to the pilot study sample (Sample 1 and Sample 2 described above). Revisions to the scale followed each administration. The following is Rose's description of the process used to determine inclusion or exclusion of the items in the scale:

Selection of items for inclusion or exclusion from the scale was determined via an iterative rational-statistical process. Beginning with the pilot study administration, each round of data collection was followed by examination of item statistics and re-administration of the scale to a new sample. Items with good statistical properties were retained for the next round of data collection; items with poor statistical properties were candidates for deletion. Specifically, the IMS used in the second sample (N = 250) contained 103 items. Eight of the original 111 items had been deleted after an examination of mission data, item total correlation, item distributions, and internal consistency. The IMS used in the third sample (N = 380) contained 76 items. Twenty-seven of the 103 items from the previous administrations had been deleted because of their performance in the

factor analysis (they did not load uniquely and significantly on one factor (p. 478).

The final administration of the scale containing 34 items was given to a group of 800 graduate students randomly selected from the population of 2,617 enrolled doctoral students. "43 of these were found to be ineligible (no longer enrolled). Of the remaining 757 students, 380 returned questionnaires (50% response rate). Data from the administration of the IMS for samples 2 and 3 were subjected to rigorous Exploratory Factor Analysis (EFA) and compared side-by-side. Rose presents data beginning with a 10 factor solution and a comparison of the two samples. Results of the factor analysis retained 34 items in the scale with three underlying dimensions represented by the factor solution; Integrity, which embodies respectfulness for self and others and empowers protégés to make deliberate, conscious choices about their lives; Guidance, which represents aspects of the day-to-day work of a graduate student, such as solving research problems and planning presentation of one's work (p. 487); and Relationship which connotes a sharing of the aspects of oneself that are traditionally viewed as private or somewhat more intimate than is typically the case in student-faculty relationsihips (p. 487). These underlying dimensions, or factors, account for the variation and covariation of the observed items (variables). "Factor analysis attempts a more parsimonious understanding of the covariation among a set of indicators because the number of factors is less than the number of measured variables" (Brown, 2006, p. 13). Thus, Rose did, in fact, follow the rigorous three step process of scale construction described by Wegener & Fabrigar (2004). She

defined the purpose and theoretical underpinnings of the scale, through an iterative process, she generated a sufficiently large group of items to measure the defined construct, and they were subjected to both EFA and item analysis to evaluate the validity of the items for the final scale.

Rose used principal factor EFA to extract the factors and then applied varimax rotation to determine the number of factors to retain in her final solution. She also examined scree plots where the data were plotted against the factor number to look for the change in slope indicating rejection of the higher factor number solutions. Rose was working with scores from two different samples administered sequentially. To examine factor structure reliability, she compared the correlated factor scores between the two groups for each level of factor solution. Her results showed that the content of factors 1 through 3 was consistent across samples and across solutions (Rose, 2003).

In Confirmatory Factor Analysis (CFA) the underlying structure is known based on either theory or previous empirical research studying the underlying latent variable structure. Therefore, we put forth an a priori CFA model.

The a priori hypothesized structure of the CFA model is subjected to a series of statistical procedures to test the covariance structures of the entire system for construct validity and goodness of fit. Because the structure of the model can be represented pictorially to visualize the construct under study, and because causal processes can be represented by a series of regression equations, CFA belongs to a class of methodology called Structural Equation Modeling (SEM; Byrne, 2003).

CFA can provide evidence for both convergent validity and discriminant validity as a result of analyzing the hypothesized factor structure. Convergent validity is the degree to which the items are positively related to other items that measure the same construct. Discriminant validity is the degree to which the items measuring different constructs are unrelated to each other. In the case of the IMS, it has a three factor structure measured by 34 polytomous variables with ordered responses. The three dimensions underlying the IMS scale are Integrity (measured by 14 items), Guidance (measured by 10 items), and Relationship (measured by 10 items. Taken together, indices of convergent and discriminant validity provide researchers with evidence that the constructs investigated measure what they purport to measure and, over time, confirm their value to those who use them. Bell-Ellison and Dedrick (2008) evaluated the three-factor solution for IMS using CFA with robust WLS. Their results indicated that the 3-factor model did not fit the data well (CFI = .838, SRMR = .096, RMSEA = .102). They further suggested that the addition of several error covariances could improve the model fit.

Data collection. To cast the widest possible net, in September, 2011, an invitation was issued by e-mail to all ASU students enrolled in a graduate program to take the IMS using a link to Survey Monkey, an online survey service (Appendix G). One and only one reminder e-mail to participate in the study was sent one week after the original invitation (Appendix H). Once a graduate student clicked on the link to participate in the survey, they were taken to the Survey Monkey site where they were provided with a more extensive informed consent to read prior to taking the survey (Appendix D). I excluded students enrolled in an

MBA program or a JD program due to the fact that those programs have a different structure and do not include a graduate mentoring committee structure such as those under study. I issued 10,823 e-mail invitations to participate in Phase 1 of the study and 1187 students participated, for a participation rate of 11%.

At the conclusion of the online survey instrument there were demographic questions, designed to determine how long they had been enrolled in their program, whether they had a current mentor, the name of their program, their age, the degree they were pursuing, etc. Those data were used to determine the pool of possible participants to be invited to participate in Phase 2 of the study. Only doctoral students were retained for invitation to the second part of the study.

Participant description. In the current study, data were collected using *Survey Monkey*, an online survey construction and administration software. The number of questionnaires collected was 1,187. The valid percent for male was 41.3% and the valid percent for female was 58.7% as compared to 49.2% and 50.8% respectively for the ASU graduate student population. The mean age of participants was 33.91 years (*SD* = 9.50 years). Two hundred forty participants were pursuing a Master's degree (or already had obtained a Master's degree), and 299 participants were pursuing a Doctorate degree (or already had obtained a doctoral degree). The ethnic composition was Caucasian, 71.6%, compared to the ASU graduate student population of 58.8%. Asian American or Asian, 13.8%, compared to 4.5% for the ASU graduate student population. African American or Black, 4.7%, compared to 3.6% for the ASU graduate student population.

Mexican American or Chicano, was 4.1%, as compared to 9.5% in the ASU graduate student population. American Indian or Alaskan, was 1.1%, as compared to 1.6% in the ASU graduate student population. Native Hawaiian or Pacific Islander was 0.4% as compared to 0.1% for the ASU graduate student population. Puerto Rican was 0.7%, and Other Latino was 3.6%, for which there are no comparable percentages available. Participants self-identified their ethnicity, so the last two categories do not match the standardized categories for which data are routinely recorded. The comparisons above are from data for the 2009-10 academic program profile for the Graduate College at ASU.

Analysis. Given that some items of the Relationship subscale items do not actually describe the term relationship (ex., …be seldom sad or depressed), and that Bell-Ellison and Dedrick (2008) indicated in their study the 3-factor solution did not have a good model fit for their sample, EFA was applied first in the current case to determine whether there existed other possible solutions for the IMS. The sample was randomly divided into two parts. Sample 1 (N = 607) was used for EFA, and Sample 2 (N = 580) was used for CFA.

SPSS 16 was used for EFA. When conducting EFA, principal axis factoring (PAF) was applied. The scree-plot based on eigenvalues from PAF was used to determine the number of factors. To improve the interpretability of each factor, direct oblimin rotation was conducted. Direct oblimin is an oblique rotation that uses a parameter (delta) to control the correlations among factors. In the current research, we used the default value of zero for delta.

Mplus 6.12 was used for CFA. Given that the data analyzed in the current study was ordinal, a robust maximum likelihood mean-adjusted (MLM) estimator was applied to avoid the influence of non-normality to some extent. When using MLM, mean and covariance structure, rather than covariance structure only, was analyzed. In addition, we could obtain robust standard errors for parameter estimates and the Satorra–Bentler scaled chi-square. Based on the Satorra–Bentler scaled chi-square and scaling correction factor for MLM, nested models were compared using the robust chi-square difference test using a computer program provided by Crawford and Henry (2003) and found at http://www.abdn.ac.uk/~psy086/dept/sbdiff.htm. After selecting the final model based on CFA, latent mean differences were evaluated using structured means modeling (SMM; Thompson & Green, 2006). In the previous studies (e.g., Bell-Ellison & Dedrick, 2008), group comparisons on each subscale for the IMS were conducted using observed scores. The advantage of using SMM is that we are able to take into account the measurement errors and non-invariance of factor loadings or intercepts across groups when comparing two groups.

The Qualitative Component of the Study

Instrument: *Questionnaire on Supervisor-Doctoral Student Interaction*. Introduction to the qualitative component of this study used an instrument designed to examine the characteristics of an existing faculty supervisor and doctoral student relationship. It is written from the perspective of the doctoral student's perception of the supervisor's interpersonal style. It was developed by a team of researchers from Utrecht University in The Netherlands: Drs. Tim

Mainhard, Roeland van der Rijst, Jan van Tartwijk, and Theo Wubbels. I received e-mail permission from the team to use their instrument with appropriate credit.

This model was specifically developed to provide feedback to the faculty member about a specific relationship. The objective was to provide feedback and assessment of the quality and synergy of the supervisor's interpersonal style. The belief was that if the relationship was maximized, the quality of the dissertation and the doctoral experience would be enhanced in a positive way.

The model is based on two dimensions, Influence and Proximity, with underlying behavior types: leadership, helpful/friendly, understanding, giving students freedom and responsibility, uncertain, dissatisfied, admonishing, and strict (Mainhard et al., 2009). The following figure illustrates the model and behavior types and the circumplex nature of the model:

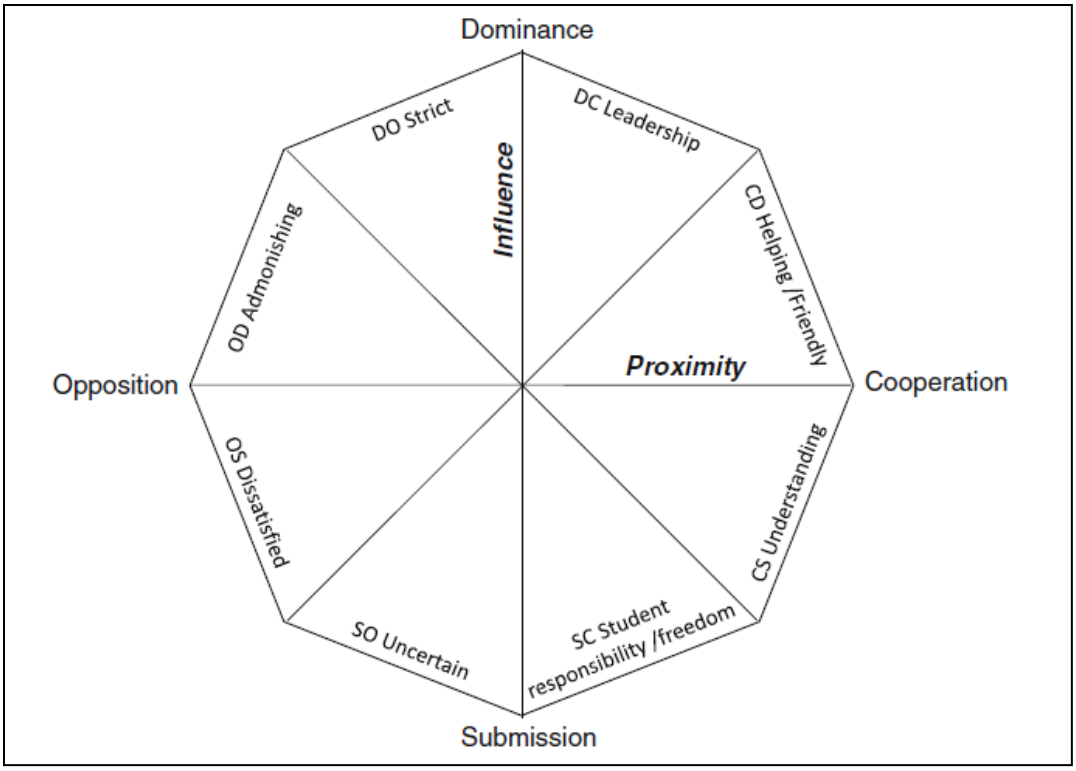

Figure 1. The model for interpersonal supervisor behavior.

The authors describe their model in the following excerpt (p. 362):

> An important aspect of our model is that the dimensions map a degree of behavior. A behavior that a supervisor displays has a degree of Influence and Proximity. The higher the degree of Influence the higher the behavior is displayed on the vertical axis and similarly for the degree of Proximity on the horizontal axis. For the eight sectors this means that the closer a behavior is to the center of the model the lower the intensity of the behavior is. Another characteristic of our model is that the dimensions are independent. One might feel that showing behavior with a high

> degree of Influence needs to imply to be close to the other person, or the other way around that Influence always implies to be also a bit to the left on the Proximity dimension, showing oppositional behavior; however, such associations are not necessarily: high Influence behaviors as well as low Influence behaviors can go together with high or low Proximity behaviors. For example, a supervisor may provide guidance either by setting strict rules solely based on his/her own experience (high Influence, somewhat opposition) or by anticipating on or adapting to the student's wishes (high Influence, somewhat cooperation).

Mainhard et al., based their questionnaire on a model previously developed as a project of the Australian Research Council called the Postgraduate Research Experience Questionnaire (PREQ). The PREQ was developed "in a thorough process of literature review, analyses of good practice, institutional evaluation, and involving existing instruments" in 1999.

"The PREQ appeared not to be useful to compare institutions but is a valuable measurement instrument for perceptions of individual students with good content and face validity and good psychometric characteristics such as the factor structure and scale reliability" (p. 364). Therefore, the PREQ was administered alongside the QSDI to verify the concurrent validity of the QSDI. Based on the following table of Cronbach's α's, the authors determined the model to be "a reliable instrument to gather data about doctoral students' perceptions of their

supervisor's interpersonal style in the relationship with a particular student" (p. 368):

Table 2

Cronbach's α and Item Example Per Scale of the Postgraduate Research Experience Questionnaire

Scale	Cronbach's α	Item example
Supervisor	.91	Supervision is available when I need it
Skill development	.87	My research sharpens my analytical skills
Climate	.89	I am integrated into the department's community
Infrastructure	.84	I have access to a suitable working space
Clarity	.84	I understand the requirements of the thesis examination

The authors recommend using the model for future research to complement the doctoral student's view of the supervisor with the supervisor's self-perception of his/her relationship with their doctoral student. The following figure shows the way in which I had planned to use the model (p. 369). I planned to use it for a one-on-one comparison of the doctoral student's perception of the relationship as compared to the supervisor's self-perception of his/her own supervisory style:

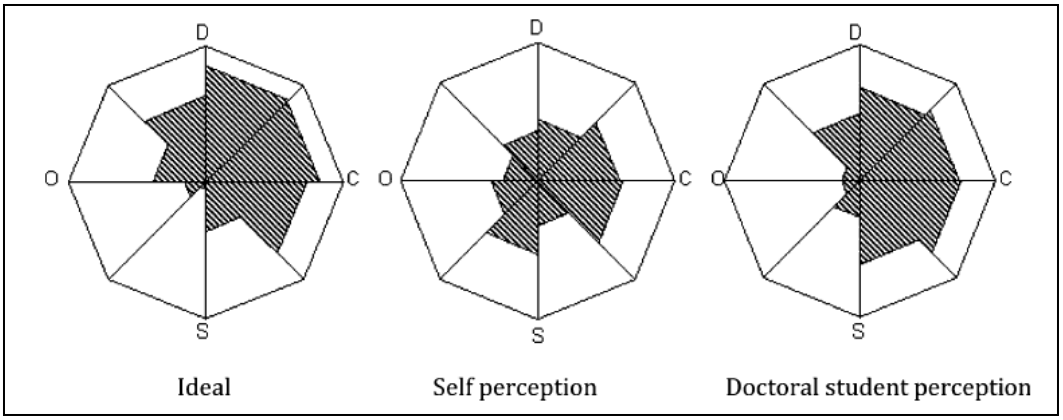

Figure 2. Example of supervisor ideal, supervisor self-perception, and Doctoral student perception.

The reason I chose this instrument is because the questionnaire is well thought out and insightful, in my personal opinion as a doctoral student. My objective was not to generalize any findings from this small sample, but to engage with doctoral students and their faculty supervisor to examine the results for consistencies and inconsistencies in the perception of doctoral student and faculty member. My plan was to use it to open dialogue for the improvement of the relationship with the objective of improving the resulting dissertation, satisfaction with the doctoral experience, and completion of the degree. Unfortunately, due to non-participation by faculty mentors it could not be used in that way. It was used instead to open dialogue with participating doctoral students, in order to gain a better understanding of the relationship with their mentors from the student's perspective.

Data collection. From the participants in Phase 1 of the study, a pool was generated containing the names of doctoral students who had been enrolled in

their program since Fall 2007 or before to ensure that invitations were issued to students who had been enrolled in their program long enough to be knowledgeable about their program, likely to have chosen their dissertation committee, and unlikely to be planning to leave their program with only their Master's degree. The resulting pool contained 115 students eligible to be invited to participate in Phase 2 of the study. The names were placed in an Excel spreadsheet and the random number generator tool was used to randomly select the order in which students would be invited to participate in the second survey and semi-structured interview (Appendix I). There was one and only one reminder e-mail to participate in Phase 2 of the study (Appendix J) sent one week after the first invitation for Phase 2.

For each doctoral student participating in the second part of the study and taking the QSDI, individual semi-structured interviews were conducted with the doctoral student to gather additional qualitative data about their experience in the relationship. The plan was to invite their faculty mentor to participate in the QSDI survey and semi-structured interview to compare the perceptions of the relationship from the doctoral student's point of view with the self-perception of the relationship from the faculty mentor's point of view.

Invitations were issued in groups of twenty to the doctoral students with the hope of recruiting ten sets of doctoral student/faculty mentor dyads to participate in the study. Invitations began in November, 2011, with interviews commencing November 23, 2011. Once I interviewed the doctoral student and obtained their permission to invite their faculty mentor to participate, I began

issuing invitations to faculty mentors to participate (Appendix J). Despite offering to accommodate the schedules of the faculty members and even offering telephone interviews scheduled at their convenience, of the first ten doctoral students, two faculty mentors declined to participate, one declined because he was on sabbatical, six simply did not respond to the invitation or the reminder e-mail, and only one faculty member was willing to participate. In January, with permission from my committee members, the study was changed to forfeit the faculty perspective due to lack of participation and open the study to additional doctoral students.

As a result of changing conditions of the study, the following matrix illustrates the changes in the research questions:

Table 3

Research Question Matrix

Original Research Question	Conceptual Framework	Modified Research Question
Is the Ideal Mentor Scale a valid measure to assess Integrity, Guidance, & Relationship desires of doctoral students as they relate to their perception of an ideal mentor at a large Research 1 university?	Survey Research	Is the Ideal Mentor Scale a valid measure to assess Integrity, Guidance, & Relationship desires of doctoral students as they relate to their perception of an ideal mentor at a large Research 1 university?
Do perceptions of the mentoring relationship between a doctoral student and their supervisor reveal comparable perspectives as elicited by the Questionnaire on Supervisor-Doctoral student Interaction?	Survey Research	How do doctoral students perceive the relationship between themselves and their supervising faculty member?
How do doctoral students and supervisors perceive their own and the other's role in the process of scholarly identity development of the doctoral student?	Role Identity Theory	How do doctoral students perceive their own and the supervisor's role in the process of scholarly identity development?
To what extent is each of Boyer's four Domains of Scholarship explicitly addressed in doctoral student training?	Boyer's Four Domains of Scholarship	To what extent is each of Boyer's four Domains of Scholarship explicitly addressed in doctoral student training?

Seventeen doctoral students participated, representing fifteen departments at ASU. In addition, the Graduate Director or graduate support staff member for

the doctoral student's academic program was interviewed to gather additional information about their specific program environment and characteristics to provide possible triangulation of data. Of the fifteen departments, thirteen agreed to interviews. The change in the study design actually resulted in a much larger variety of departments represented than would have been represented in the original plan; only six departments would have been represented by the original ten doctoral student participants (four students were from the same department).

All interviews were audio-taped and transcribed resulting in a data corpus of 550 pages for Phase 2 of the study. Electronic files pertaining to the study have been kept in encrypted files and any printed copies of data have been secured under lock and key. All records will be retained for three years.

To ensure the collection of qualitative data that would provide valid results upon analysis, participants were repeatedly asked follow-up probing questions seeking their true and accurate meaning perspectives of their lived experience in their doctoral program. Like the doctoral students, graduate directors were asked repeated, probing questions to provide a complete understanding from their perspective of the characteristics of the doctoral programs they serve and participate in creating. The approach to qualitative data analysis was always planned to be Erickson's modified analytical inductive approach (Erickson, 1986), so the interview protocols (Appendix B, Appendix C) were designed to collect a broad view of the experience from the perspectives of the doctoral students and graduate support staff members to collect the most complete data corpus possible containing the meaning perspectives of the

participants. I believe the study captured the specific experience of the individual with as much contextual information possible. I wanted to know not just what they had experienced but what that meant to them both personally and in terms of their doctoral journey. The resulting transcribed data was a rich corpus of data complete with as much of the participants' meaning perspectives as possible. The data corpus allowed me to examine both the universality and the particularity of their experiences. By paying close attention to the individual details of each case, I was able to discover the universalities of the doctoral experience across all participants.

Participant description. The sample of doctoral students interviewed for Phase 2 of this study was comprised of a total of seventeen doctoral students; seven males (41%) and ten females (59%). They represented fifteen departments at ASU. They were all pursuing a Doctorate degree and expected to finish either May, 2012, or within the following academic year. The graduate directors and graduate support staff members interviewed for Phase 2 of this study were comprised of a total of thirteen representatives; one male (7%) and twelve females (93%). Three of the participants interviewed were assistant professors and the rest were graduate support staff members responsible for the day-to-day operations of the graduate programs.

Chronology. The first interview with a doctoral student took place on November 23, 2011, and the final interview took place February 22, 2012. No interviews took place from December 2, 2011, through January 24, 2012. During that time all efforts were centered on attempting to schedule interviews with

faculty mentors for the doctoral students who had already participated in the interview portion of Phase 2 of the study. Once it was determined that the focus of the study had to be changed from ten sets of doctoral students and their mentors to doctoral students only, a new goal was set for the participation of twenty doctoral students along with their respective graduate support representatives. Interviews resumed January 25, 2012, and concluded February 22, 2012. Each doctoral student interview took approximately one hour. Each graduate support staff interview took 20 minutes to 45 minutes, depending on the participant.

Analysis. Each interview was recorded and MP3 files were submitted electronically to an outside transcription service. Each file was identified only by a number and no complete names were contained in the recordings. Once the transcriptions were received they were assembled into two master electronic data files and kept on an encrypted flash drive that never left my possession. The first master file contained doctoral student interviews and the second file contained graduate staff interviews. A master printout was generated for each containing no participant names.

The first reading of the data corpus was done in chronological order of the interviews; doctoral student master file followed by the graduate staff master file. The second reading of the data corpus was done by program. Each doctoral student interview was read followed by their graduate staff member interview. During this reading categories began to be identified and color coded in association with developing assertions. Twenty-six initial assertions were developed. The third examination of the data corpus was again by department

with doctoral student interviews followed by graduate staff member interviews. During that examination data were examined for disconfirming evidence and peripheral issues. Vignettes were written for initial identification of four groups of universal issues. The final examination of the data produced an overall picture of the practices developed by the represented departments in the study intended to facilitate the journey to the doctorate and suggest the way in which we might implement a more explicit pedagogy with the intention of facilitating doctoral completion.

Based on Erickson's modified analytical induction approach, validity of the qualitative portion of the study resides in the final assertions, documentation of disconfirming evidence, construction of representative vignettes from the data, thick description with interpretive commentary illuminating the linkages between components of the study (assertions, discussion, and conclusions). Every effort was made to make well-documented decisions based on completeness of the data, precision, and employment of multiple perspectives and methods to yield a coherent and plausible set of conclusions and recommendations. Every effort was made to minimize bias at every stage of the study.

In the following chapter I discuss the results of the quantitative component of the study, the quantitative analysis of the IMS, followed by the results of the qualitative component of the study, the qualitative analysis of the semi-structured interviews of doctoral students and graduate support staff participants.

CHAPTER 4

Results

The Quantitative Component of the Study

Results from Exploratory Factor Analysis

Means and standard deviations of each IMS item for Sample 1 are shown in Table 4. The scree plot based on eigenvalues obtained using PAF indicated a four-factor model (as shown in Figure 3), which accounted for 20.51%, 6.38%, 4.74% and 4.41% of variance, respectively. Given that there was no evidence the factors were uncorrelated with each other, oblique rotation was applied.

Table 4

Mean and Standard Deviation of Each Item for Ideal Mentor Scale

Item	Sample 1 (N = 607)		Sample 2 (N = 580)	
	M	*SD*	*M*	*SD*
1. showing me how to employ relevant research techniques	4.04	.94	4.08	.89
2. giving me specific assignments related to my research problem	3.48	1.07	3.60	1.04
3. giving proper credit to graduate students	4.01	.93	4.01	.93
4. taking me out for dinner and/or drinks after work	1.71	.83	1.72	.89
5. preferring to cooperate with others than compete with them	4.00	.96	4.07	.93
6. helping me to maintain a clear focus on my research objectives	4.41	.72	4.47	.66
7. respecting the intellectual property rights of others	4.35	.83	4.39	.76
8. being a role model	4.05	.92	4.07	.89
9. brainstorm solutions to a problem concerning my research project	4.22	.79	4.19	.81
10. being calm and collected in times of stress	4.06	.81	4.00	.85
11. being interested in speculating on the nature of the universe or the human condition	2.82	1.14	2.78	1.16
12. treating me as an adult who has a right to be involved in decisions that affect me	4.51	.68	4.48	.72
13. helping me plan the outline for a presentation of my research	3.56	.99	3.64	1.01
14. inspiring me by his or her example and words	3.86	.87	3.86	.92
15. rarely feeling fearful or anxious	3.12	1.03	3.06	1.02
16. helping me investigate a problem I am having with research design	4.09	.81	4.14	.71
17. accepting me as a junior colleague	3.61	.96	3.61	.96
18. being seldom sad or depressed	2.77	1.03	2.73	1.05
19. advocating for my needs and interests	4.17	.81	4.13	.83
20. talking to me about his or her personal problems	1.72	.78	1.70	.74
21. generally trying to be thoughtful and considerate	3.93	.79	3.95	.81
22. being a cheerful, high-spirited person	3.03	.93	3.13	.95
23. valuing me as a person	4.29	.76	4.32	.76
24. having coffee or lunch with me on occasion	2.36	1.07	2.38	1.02
25. keeping his or her workspace neat and clean	2.17	1.04	2.12	.99
26. believing in me	4.35	.76	4.36	.77
27. meeting with me on a regular basis	3.92	.89	3.93	.84
28. relating to me as if he/she is a responsible, admirable older sibling	2.20	.98	2.19	1.03
29. recognizing my potential	4.14	.81	4.15	.79
30. helping me to realize my life vision	3.33	1.09	3.32	1.09
31. helping me plan a timetable for my research	3.93	.93	3.97	.84
32. working hard to accomplish his/her goals	3.81	.85	3.87	.87
33. providing information to help me understand the subject matter I am researching	4.05	.84	4.07	.79
34. being generous with time and other resources	3.84	.76	3.79	.76

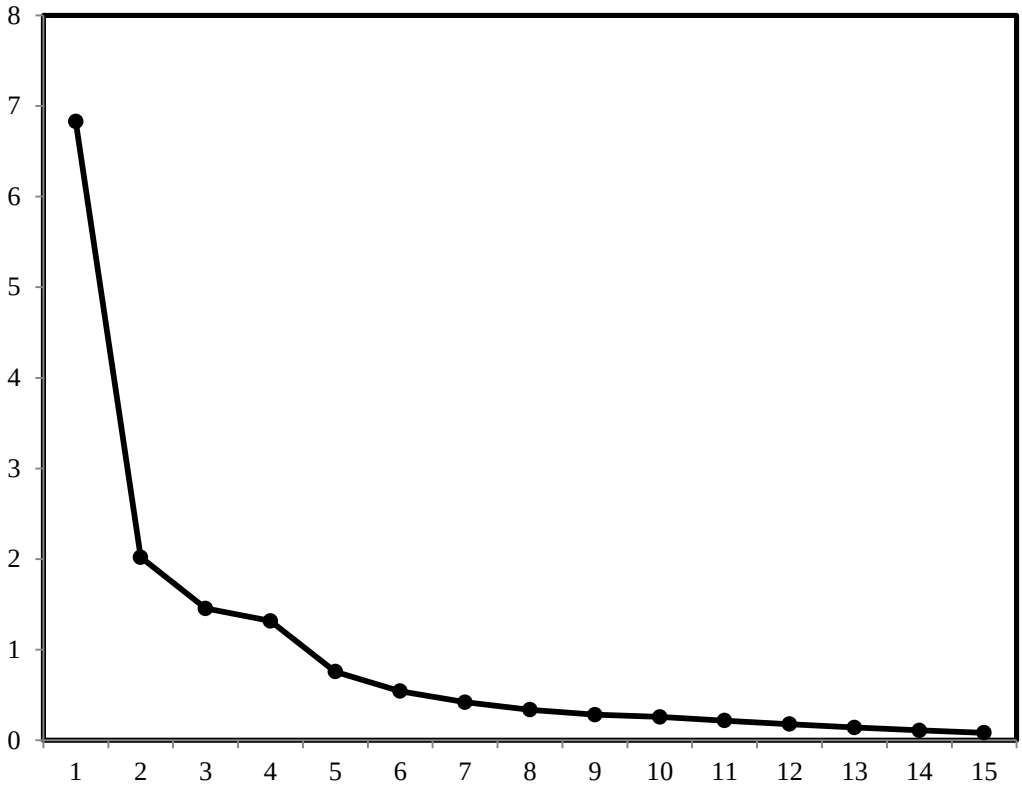

Figure 3. Scree plot obtained from principal axis factor analysis.

The pattern coefficients and structure coefficients are shown in Table 5. Factor pattern coefficients reflect the unique contribution of a given factor to the variance of the item, whereas factor structure coefficients reflect the zero-order correlation between a factor and the item. For the four-factor solution, the item that had the largest pattern loading on a factor also had the largest structure loading on the same factor, so the item was considered to load on this factor. Research (Choi, Fuqua & Newman, 2009) has suggested the loading value of .40 is indicative of a sufficient item loading on a given factor. In the current study, 23 of the 34 items had a pattern loading greater than .40, and 31 of the 34 items had a

structure loading greater than .40. There were no cross-loading problems for the 23 items with a pattern loading greater than .40, and the difference between the primary pattern loading and other loadings were greater than .10. Six of the 11 items that did not have a pattern loading greater than .40 did not have obvious double-loading problems because the differences between the largest pattern loading and all other pattern loadings were not less than .10. Thus, these six items were considered to load on the factor associated with the primary loading. The remaining five items were considered to load on the factor with the largest pattern coefficient and structure coefficient.

Table 5

Exploratory Factor Loadings for Ideal Mentor Scale *(Sample 1, N = 607)*

Item	Factor 1: Affective Advocacy	Factor 2: Academic Guidance	Factor 3: Scholarly Example	Factor 4: Personal Relationship	h^2
	P (S)	P (S)	P (S)	P (S)	
3. giving proper credit to graduate students	**.36 (.38)**	-.09 (-.22)	-.02 (.11)	-.05 (.02)	.15
5. preferring to cooperate with others than compete with them	**.40 (.41)**	.01 (-.16)	.07 (.18)	-.06 (.03)	.17
7. respecting the intellectual property rights of others	**.33 (.35)**	-.14 (-.25)	.00 (.10)	-.19 (-.13)	.17
12. treating me as an adult who has a right to be involved in decisions that affect me	**.52 (.49)**	.03 (-.17)	-.02 (.13)	-.05 (.04)	.25
14. inspiring me by his or her example and words	**.36 (.50)**	-.12 (-.34)	.28 (.44)	.02 (.15)	.35
17. accepting me as a junior colleague	**.39 (.46)**	-.13 (-.29)	-.02 (.18)	.17 (.25)	.25
19. advocating for my needs and interests	**.56 (.60)**	-.09 (-.30)	-.06 (.17)	.14 (.23)	.38
21. generally trying to be thoughtful and considerate	**.40 (.52)**	-.06 (-.29)	.24 (.41)	.12 (.25)	.35
23. valuing me as a person	**.66 (.69)**	.07 (-.23)	.14 (.34)	.07 (.21)	.50
26. believing in me	**.72 (.71)**	.06 (-.22)	-.04 (.20)	.11 (.23)	.52
29. recognizing my potential	**.63 (.67)**	.02 (-.25)	.04 (.28)	.20 (.32)	.49
32. working hard to accomplish his/her goals	**.33 (.45)**	-.07 (-.27)	.23 (.38)	.08 (.20)	.27
1. showing me how to employ relevant research techniques	-.02 (.19)	**-.57 (-.55)**	-.03 (.11)	-.06 (-.03)	.31
2. giving me specific assignments related to my research problem	-.22 (.04)	**-.53 (-.50)**	.19 (.26)	-.05 (-.01)	.30
6. helping me to maintain a clear focus on my research objectives	.24 (.37)	**-.45 (-.51)**	-.06 (.11)	-.14 (-.08)	.32
9. brainstorm solutions to a problem concerning my research project	.21 (.38)	**-.47 (-.54)**	-.04 (.16)	.02 (.09)	.33
13. helping me plan the outline for a presentation of my research	-.10 (.17)	**-.59 (-.59)**	.11 (.25)	.03 (.08)	.36
16. helping me investigate a problem I am having with research design	.09 (.33)	**-.67 (-.69)**	-.07 (.15)	.02 (.08)	.48
27. meeting with me on a regular basis	.14 (.31)	**-.33 (-.41)**	.04 (.21)	.16 (.22)	.22
31. helping me plan a timetable for my research	-.03 (.22)	**-.68 (-.66)**	-.04 (.14)	.00 (.04)	.44
33. providing information to help me understand the subject matter I am researching	.04 (.30)	**-.63 (-.66)**	.02 (.22)	.06 (.12)	.44
34. being generous with time and other resources	.26 (.42)	**-.33 (-.44)**	.02 (.23)	.19 (.26)	.31
8. being a role model	.33 (.44)	-.03 (-.25)	**.36 (.45)**	-.08 (.06)	.31
10. being calm and collected in times of stress	.31 (.40)	.04 (-.18)	**.36 (.43)**	-.07 (.07)	.27
15. rarely feeling fearful or anxious	.09 (.29)	-.04 (-.25)	**.66 (.67)**	-.13 (.04)	.47

18. being seldom sad or depressed	.04 (.25)	-.06 (-.25)	**.65 (.66)**	-.09 (.07)	.45
22. being a cheerful, high-spirited person	.00 (.24)	-.06 (-.24)	**.60 (.65)**	.15 (.29)	.45
25. keeping his or her workspace neat and clean	-.05 (.14)	-.02 (-.15)	**.49 (.51)**	.16 (.27)	.29
4. taking me out for dinner and/or drinks after work	-.01 (.04)	.02 (.02)	-.14 (-.02)	**.61 (.57)**	.35
11. being interested in speculating on the nature of the universe or the human condition	.00 (.13)	-.04 (-.12)	.22 (.30)	**.28 (.33)**	.17
20. talking to me about his or her personal problems	-.02 (.08)	.12 (.03)	.20 (.27)	**.50 (.53)**	.32
24. having coffee or lunch with me on occasion	.12 (.23)	-.06 (-.14)	-.09 (.11)	**.66 (.67)**	.47
28. relating to me as if he/she is a responsible, admirable older sibling	.01 (.20)	-.07 (-.19)	.29 (.41)	**.40 (.47)**	.32
30. helping me to realize my life vision	.22 (.39)	-.19 (-.32)	.08 (.29)	**.39 (.46)**	.34

The theoretical meaningfulness also supported the four-factor solution. The four factors were Affective Advocacy, Academic Guidance, Scholarly Example, and Personal Relationship. Table 6 illustrates the question stems for the 34 items in the scale, including their original factor identification and the factors with which they are associated in the new model. The Affective Advocacy factor consisted of 12 items of the original 14-item Integrity subscale. The items loaded on Academic Guidance factor were exactly the set of items loading on the original Guidance subscale. The Scholarly Example factor consisted of two items of original Integrity subscale and four items of original Relationship subscale. The Personal Relationship factor consisted of six items of the original 10-item Relationship subscale.

Table 6

Comparison of Categories for Three-factor Model versus Proposed New Four-factor Model

Item No.	Stem	Factor 1: Affective Advocacy	Factor 2: Academic Guidance	Factor 3: Scholarly Example	Factor 4: Personal Relationship
3	Give proper credit to graduate students	Integrity			
5	Prefer to cooperate with others than compete with them	Integrity			
7	Respect the intellectual property rights of others	Integrity			
12	Treat me as an adult who has a right to be involved in decisions that affect me	Integrity			
14	Inspire me by his or her example and words	Integrity			
17	Accept me as a junior colleague	Integrity			
19	Advocate for my needs and interests	Integrity			
21	Generally try to be thoughtful and considerate	Integrity			
23	Value me as a person	Integrity			
26	Believe in me	Integrity			
29	Recognize my potential	Integrity			
32	Work hard to accomplish her/her goals	Integrity			
1	Show me how to employ relevant research techniques		Guidance		
2	Give me specific assignments related to my research problem		Guidance		
6	Help me to maintain a clear focus on my research objectives		Guidance		
9	Brainstorm solutions to a problem concerning my research project		Guidance		
13	Help me plan to outline for a presentation of my research		Guidance		
16	Help me investigate a problem I am having with research design		Guidance		
27	Meet with me on a regular basis		Guidance		
31	Help me plan a timetable for my research		Guidance		
33	Provide information to help me understand the subject matter I am researching		Guidance		
34	Be generous with time and other resources		Guidance		
8	Be a role model			Integrity	
10	Be calm and collected in times of stress			Integrity	
15	Rarely feel fearful or anxious			Relationship	
18	Be seldom sad or depressed			Relationship	
22	Be a cheerful, high-spirited person			Relationship	
25	Keep his or her workspace neat and clean			Relationship	
4	Take me out for dinner and/or drink after work				Relationship
11	Be interested in speculating on the nature of the universe or the human condition				Relationship
20	Talk to me about his or her personal problems				Relationship
24	Have coffee or lunch with me on occasion				Relationship
28	Relate to me as if he/she is a responsible, admirable older sibling				Relationship
30	Help me to realize my life vision				Relationship

The correlations among the four factors are shown in Table 7. As seen in Table 7, the correlation between the Affective Advocacy and Academic Guidance factors was .39, which was smaller than the correlation between the original Integrity subscale and the original Guidance subscale obtained via EFA in Rose's study (r = .55 and r = .52, respectively). The correlation between the Affective Advocacy factor and the Personal Relationship factor was .17, was much smaller than the correlation between the original Integrity subscale and the Relationship subscale obtained via EFA in Rose's study (r = .33 and r = .40). The correlation between the Academic Guidance factor and Personal Relationship factor was trivial, whereas the correlation between the original Guidance subscale and Relationship subscale was .29 and .36 in Rose's two samples. The Scholarly Example factor was a new factor, and its correlations with the Affective Advocacy, Academic Guidance, and Personal Relationships factors were .32, .28, and .22.

Table 7

Correlations among Factors Obtained using Exploratory Factor Analysis

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1: Affective Advocacy	1.00	-.39	.32	.17
Factor 2: Academic Guidance		1.00	-.28	-.08
Factor 3: Scholarly Example			1.00	.22
Factor 4: Personal Relationship				1.00

Twelve items loaded on Factor 1, Affective Advocacy, as shown in Table 6. These twelve items were identified as Integrity in Rose's study, but an examination showed that they all related to an emotional or advocate statement

and were thus named in the new factor, Affective Advocacy. The second factor still contained items all formerly categorized as Guidance, but an examination of the questions revealed that in the new four-factor model they all related to Academic Guidance rather than just general Guidance. For the third factor participants seemed to differentiate between items that related more to a Scholarly Example than to Integrity and Relationship. So, although the items in factor three were formerly related to two categories, Integrity and Relationship, in Rose's study, they were better described as relating to a Scholarly Example. The balance of the items formerly relating to Relationship were all items better categorized in the new model as Personal Relationship.

Results from Confirmatory Factor Analysis

CFA was conducted on Sample 2 to compare the proposed four-factor solution and the original three-factor solution. The mean and standard deviation of each IMS item for Sample 2 are given in Table 4. Given that these two models were not nested, Akaike's information criterion (AIC) and Bayesian information criterion (BIC) were used to determine which model provided a better fit to the data; smaller values of AIC or BIC indicate a better fit. Goodness-of-fit indices for the three-factor model and the four-factor model are shown in Table 8. As seen in Table 8, CFI and TLI were less than .80 for both of the two models, which suggested a poor model fit; however, the value of RMSEA (.06) and SRMR (.07) for both of two models indicted a good model fit, according to the criteria proposed by Hu and Bentler (1998). The AIC and BIC for the four-factor model

were smaller than those for the three-factor model, which suggested that the four-factor model had better fit.

Table 8

Overall Model Fit Indices for Three- and Four-factor Models (Sample 2, N = 580)

Model	S-B χ^2	*df*	CFI	TLI	RMSEA (90% CI)	SRMR	AIC	BIC
Three-factor model	1687.99	524	.74	.72	.06 (.059, .065)	.07	47267.39	47725.51
Four-factor model	1572.34	521	.76	.74	.06 (.056, .062)	.07	47146.42	47617.63

Note: S-B χ^2 = Satorra–Bentler scaled chi-square; *df* = degree of freedom for S-B χ^2 statistics; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; AIC = Akaike's information criterion; BIC = Bayesian information criterion.

Given that the four-factor model fit better than the three-factor model in terms of AIC and BIC, and that the values of RMSEA and SRMR suggested a good model fit, the four-factor model was selected for subsequent analyses. All of the standard factor loadings for the four-factor model were significantly different from zero. For the Affective Advocacy factor, the standard factor loadings ranged from .31 to .69. For the Academic Guidance factor, the standard factor loadings ranged from .37 to .58. For the Scholarly Example factor, the standard factor loadings ranged from .41 to .63. For the Personal Relationship factor, the standard factor loadings ranged from .45 to .72. Brown (2006) indicated that the factor loading could be considered *salient* if its standard factor loading was larger than .30. Thus, all the factor loadings for the four-factor solution were salient. The correlation between the Affective Advocacy factor and the Academic Guidance

factor was .63, which was similar to the correlation between the original Integrity subscale and Guidance subscale obtained via CFA (r = .65) in Bell-Ellison and Dedrick's (2008) study. The correlation between the Affective Advocacy factor and the Personal Relationship factor was .47, which was similar to the correlation between the original Integrity subscale and Relationship subscale obtained via CFA (r = .48; Bell-Ellison & Dedrick, 2008). The correlation between the Academic Guidance factor and the Personal Relationship factor was .24 – smaller than the correlation between the original Guidance subscale and Relationship subscale obtained via CFA (r = .39). The correlations of the Scholarly Example factor with the Affective Advocacy, Academic Guidance, and Personal Relationship factors were .67, .54, and .51.

Results from Latent Mean Comparisons

Latent mean comparisons between male and female participants, individuals under 30 years of age or 30 years and older, and Master's versus Doctoral students were conducted under SMM, following tests of measurement invariance. Within the common factor model framework, measurement invariance was examined in terms of a series of hierarchical levels (Vandenberg & Lance, 2000). The least restrictive level is configural invariance, which requires the invariant pattern of free and fixed factor loadings across different groups. The next level tested was metric invariance, in which the factor loading of each measure on a given factor should be the same across different groups. Given that latent mean difference is of interest in the current study, the scalar (strong)

invariance was also examined, which requires the intercept for each measure to be invariant across different groups.

The overall model fit indices for a series of nested models to test latent mean differences between male and female are shown in Table 9. As seen in Table 9, configural invariance was satisfied, given the acceptable values of RMSEA and SRMR. Thus, the same factorial structure held for males and females, and the four-factor model served as baseline model for subsequent analysis. The model with all the loadings invariant was compared with the baseline model, and the result indicated that there was no significant difference between these two models, $p = .42$, which suggested that complete metric invariance of IMS was met for male and female.

Table 9

A Summary of Overall Model Fit Indices for a Series of Nested Models to Test Latent Mean Differences between Males (N = 226) and Females (N = 326)

Model	S-B χ^2	*df*	Scaling correction factor for MLM	CFI	TLI	RMSEA (90% CI)	SRMR
Model 1: Baseline Model (configural invariance)	2094.08	1042	1.087	.75	.73	.06 (.057, .064)	.08
Model 2: Model 1 and all factor loadings invariant	2124.97	1072	1.087	.75	.74	.06 (.056, .063)	.08
Model 3: Model 2 and all intercepts invariant	2202.07	1102	1.085	.74	.74	.06 (.056, .064)	.08
Model 4: Model 3 and the intercept of Item 8 free	2176.48	1101	1.085	.75	.74	.06 (.056, .063)	.08
Model 5: Model 4 and the intercept of Item 30 free	2166.40	1100	1.085	.75	.75	.06 (.056, .063)	.08
Model 6: Model 5 and the intercept of Item 5 free	2159.62	1099	1.085	.75	.75	.06 (.055, .063)	.08
Model 7: Model 6 and the intercept of Item 22 free	2154.06	1098	1.085	.75	.75	.06 (.055, .063)	.08
Model 8: Model 7 and the intercept of Item 16 free	2150.79	1097	1.085	.75	.75	.06 (.055, .063)	.08
Model 9: Model 7 and all latent means invariant	2222.31	1102	1.085	.74	.73	.06 (.057, .064)	.09
Model 10: Model 7 and the mean of Factor 1 invariant	2177.23	1099	1.085	.75	.74	.06 (.056, .063)	.08
Model 11: Model 7 and the mean of Factor 2 invariant	2169.98	1099	1.085	.75	.74	.06 (.056, .063)	.08
Model 12: Model 7 and the mean of Factor 3 invariant	2157.65	1099	1.085	.75	.75	.06 (.055, .063)	.08
Model 13: Model 7 and the mean of Factor 4 invariant	2169.84	1099	1.085	.75	.74	.06 (.056, .063)	.08

The next step was to test whether the intercepts were invariant across male and female and the result indicated that there was a significant decrease in model fit when constraining all the intercepts invariant across male and female, $p < .001$. Then, the source of non-invariance was examined based on modification index (MI). The intercept with largest MI was relaxed sequentially until the model with a given intercept relaxed was not significantly different from the model with this intercept constrained. The results indicated that the intercepts for Items 8, 30, 5, and 22 were non-invariant across males and females.

Although some researchers indicate that strong invariance is the prerequisite for latent mean comparisons (e.g., Meredith, 1993), Byrne, Shavelson, and Muthén (1989) indicate that latent mean comparisons can be conducted under partial factorial invariance. In the case of partial factorial invariance, latent mean comparisons were still conducted after constraining the invariant parameters to be the same and freely estimating those non-invariant parameters across two target samples (Thompson & Green, 2006). As seen in Table 9, Model 7 was the model in which all the invariant loadings and intercepts were constrained to be equal and all the non-invariant intercepts were freely estimated across males and females. In Model 7, the latent means for males were set at zero, and the latent means for females were freely estimated, so the estimated latent means for female group were actually latent mean differences. The model with all latent means invariant and the four models with each latent mean invariant were compared with Model 7. The results indicated that there were significant differences (a) between the model with all latent means

constrained to be equal and Model 7, p <.001; (b) between the model with latent mean of Factor 1 invariant and Model 7, p < .001, which means that the value females placed on mentors' qualities for Affective Advocacy factor was significantly different from males (standardized coefficient = .50); (c) between the model with latent mean of Factor 2 invariant and Model 7, p < .001, which means that the value females placed on mentor's qualities for Academic Guidance factor was significantly different from males (standard effect = .44); (d) between the model with latent mean of Factor 4 invariant and Model 7, p =.001, which means that the value females placed on mentors' qualities for Personal Relationship factor was significantly different from males (standard effect = -.42). The difference between the model with latent mean of Factor 3 invariant and Model 7 was marginally significant, p < .06, which means that the value females placed on mentors' qualities for Scholarly Example factor was marginally significantly different from males (standard effect = .22). In summary, females placed more value on factors relating to Affective Advocacy, Academic Guidance, and Scholarly Example, and less value on Personal Relationship than males.

The goodness-of-fit indices for a series of nested models to evaluate latent mean differences between individuals under 30 years of age and individuals 30 years and above were shown in Table 10. Table 10 showed that configural invariance was satisfied, because of the acceptable values of RMSEA and SRMR, which suggested that the four-factor model could be the baseline model for both of the age groups. The model with all loadings constrained to be equal was compared with the baseline model, and the result indicated that there was no

significant difference between these two models, $p = .41$, which suggested a complete metric invariance of the IMS for the two age groups. Regarding strong invariance, there was a significant decrease in model fit when constraining all the intercepts invariant across the two different age groups, $p = .002$.

Table 10

A Summary of Overall Model Fit Indices for a Series of Nested Models to Test Latent Mean Differences between Individuals less than 30 years old (N = 231) and Individuals 30 years old above (N = 315)

Model	S-B χ^2	*df*	Scaling correction factor for MLM	CFI	TLI	RMSEA (90% CI)	SRMR
Model 1: Baseline Model (configural invariance)	2070.50	1042	1.093	.76	.74	.06 (.056, .064)	.08
Model 2: Model 1 and all factor loadings invariant	2100.79	1072	1.094	.76	.75	.06 (.056, .063)	.08
Model 3: Model 2 and all intercepts invariant	2158.82	1102	1.092	.75	.75	.06 (.056, .063)	.08
Model 4: Model 3 and the intercept of Item 8 free	2145.15	1101	1.092	.75	.75	.06 (.055, .063)	.08
Model 5: Model 4 and the intercept of Item 9 free	2138.62	1100	1.092	.76	.75	.06 (.055, .063)	.08
Model 6: Model 5 and the intercept of Item 31 free	2131.72	1099	1.092	.76	.75	.06 (.055, .062)	.08
Model 7: Model 6 and the intercept of Item 22 free	2125.91	1098	1.092	.76	.75	.06 (.055, .062)	.08
Model 8: Model 7 and the intercept of Item 34 free	2122.42	1097	1.092	.76	.75	.06 (.055, .062)	.08
Model 9: Model 7 and all latent means invariant	2144.31	1102	1.092	.75	.75	.06 (.055, .063)	.08
Model 10: Model 7 and the mean of Factor 1 invariant	2126.43	1099	1.092	.76	.75	.06 (.055, .062)	.08
Model 11: Model 7 and the mean of Factor 2 invariant	2128.09	1099	1.092	.76	.75	.06 (.055, .062)	.08
Model 12: Model 7 and the mean of Factor 3 invariant	2129.12	1099	1.092	.76	.75	.06 (.055, .062)	.08
Model 13: Model 7 and the mean of Factor 4 invariant	2135.13	1099	1.092	.76	.75	.06 (.055, .062)	.08

Based on MI and a series of model comparisons, we found that the intercepts for Items 8, 9, 31, and 22 were non-invariant across the two age groups. As seen in Table 10, Model 7 was the model in which all the invariant loadings and intercepts were constrained to be equal, all the non-invariant intercepts were freely estimated, the latent means for the below 30 group were set to zero, and the latent means for the 30 and above group were freely estimated.

The model with all latent means invariant and the four models with each latent mean invariant were compared with Model 7. The results indicated that there were significant differences (a) between the model with all latent means constrained to be equal and Model 7, p = .001; and (b) between the model with latent mean of Factor 4 invariant and Model 7, p = .003, which means that the value individuals 30 years and above placed on mentors' qualities for Personal Relationship factor was significantly different from individuals below 30 years (standard effect = -.31). There was a marginally significant difference between the model with latent mean of Factor 3 invariant and Model 7, p =.07, which means that the value individuals 30 years and above placed on mentors' qualities for the Scholarly Example factor was marginally significantly different from individuals below 30 years (standard effect = -.19). There were no significant differences in latent means for Affective Advocacy factor (p =.46) and Academic Guidance factor (p = .14). In conclusion, students 30 and older placed less value on Scholarly Example and Personal Relationship than students under 30.

The goodness-of-fit indices for a series of nested models to evaluate latent mean differences between individuals pursuing a Master's degree (or already had

obtained a Master's degree) and individuals pursuing Doctorate degree (or already had obtained a doctoral degree) are shown in Table 11. As shown in Table 11, configural invariance was satisfied, so we could use the four-factor model as the baseline model for subsequent analysis across groups. The result of the test of metric invariance indicated that there was a significant difference between the model with all the loadings invariant and the baseline model, $p < .001$.

Table 11

A Summary of Overall Model Fit Indices for a Series of Nested Models to Test Latent Mean Differences between Master's Students (N = 240) and Doctoral Students (N = 299)

Model	S-B χ^2	*df*	Scaling correction factor for MLM	CFI	TLI	RMSEA (90% CI)	SRMR
Model 1: Baseline Model (configural invariance)	2151.33	1042	1.092	.75	.73	.06 (.059, .067)	.08
Model 2: Model 1 and all factor loadings invariant	2215.34	1072	1.092	.74	.73	.06 (.059, .067)	.09
Model 3: Model 2 and the loading of Item 2 free	2205.08	1071	1.093	.74	.73	.06 (.059, .066)	.09
Model 4: Model 3 and the loading of Item 6 free	2198.72	1170	1.092	.74	.73	.06 (.059, .066)	.09
Model 5: Model 4 and the loading of Item 1 free	2193.27	1069	1.092	.74	.73	.06 (.059, .066)	.09
Model 6: Model 5 and the loading of Item 4 free	2188.75	1068	1.092	.74	.73	.06 (.059, .066)	.09
Model 7: Model 6 and the loading of Item 20 free	2183.81	1067	1.092	.75	.73	.06 (.059, .066)	.08
Model 8: Model 7 and the loading of Item 24 free	2174.30	1066	1.092	.75	.73	.06 (.058, .066)	.08
Model 9: Model 8 and the loading of Item 5 free	2170.40	1065	1.092	.75	.73	.06 (.058, .066)	.08
Model 10: Model 9 and the loading of Item 16 free	2166.22	1064	1.092	.75	.74	.06 (.058, .066)	.08
Model 11: Model 10 and the loading of Item 32 free	2164.63	1063	1.091	.75	.74	.06 (.058, .066)	.08
Model 12: Model 10 and all the intercepts of items with invariant loadings invariant	2230.07	1086	1.091	.74	.73	.06 (.059, .066)	.08
Model 13: Model 12 and the intercept of Item 25 free	2218.76	1085	1.091	.74	.73	.06 (.059, .066)	.08
Model 14: Model 13 and the intercept of Item 19 free	2210.44	1084	1.091	.74	.73	.06 (.058, .066)	.08
Model 15: Model 14 and the intercept of Item 13 free	2202.54	1083	1.091	.75	.74	.06 (.058, .066)	.08
Model 16: Model 15 and the intercept of Item 21 free	2196.10	1082	1.091	.75	.74	.06 (.058, .066)	.08
Model 17: Model 16 and the intercept of Item 30 free	2190.71	1081	1.091	.75	.74	.06 (.058, .065)	.08
Model 18: Model 17 and the intercept of Item 26 free	2187.25	1080	1.091	.75	.74	.06 (.058, .065)	.08
Model 19: Model 17 and all latent means invariant	2195.85	1085	1.091	.75	.74	.06 (.058, .065)	.08

Based on MI and a series of model comparisons, the loadings of Items 2, 6, 1, 4, 20, 24, 5, and 16 were found to be non-invariant across Master's student group and doctoral student group. The model with invariant intercepts for all the items with invariant loadings resulted in a significant decrease in model fit, $p <$ .001. Based on MI and a series of model comparisons, we found the non-invariance of intercepts for Items 25, 19, 13, 21, and 30, in addition to the non-invariance of intercepts for items whose loadings were found to be non-invariant.

As seen in Table 11, Model 17 was the model in which all the invariant loadings and intercepts were constrained to be equal, all the non-invariant factor loadings and intercepts were freely estimated, the latent means for the Master's student group were set to zero, and the latent means for the Doctoral student group were freely estimated. In comparing the model with all latent means constrained to be equal to Model 17, there were no significant differences, $p =$ .27, which means that there were no differences in all the latent means between Master's student group and Doctoral student group.

The Qualitative Component of the Study: Semi-structured Interviews

Vignette 1: Mentorship, Vulnerability, and the Scholarship of Application

As I hurried toward the conference room, I checked to make sure I had everything I would need; recorder, list of questions, iPad for additional note-taking. It seemed I was ready for the focus group to begin. I had invited several 3rd year plus doctoral students to participate in this focus group. I passed out the informed consent statement to each participant and asked them to read and sign. "Does anyone object to my recording the session?" I asked. No one objected. "Does anyone have any questions about the informed consent?" Again, no one indicated they had any questions. "Well, then, let's get started." I looked around the table and saw Cheryl, Kelley, Kayt, Wu, James, and Andy.

"As you know, this study is about doctoral completion as it relates to the mentoring relationship. Let's talk a little bit about your definitions of a supervisor and a mentor." Cheryl spoke up right away, "I guess I would think a supervisor would, I think about when I used to wait tables and you would have the floor manager and that was your supervisor. If you had a question about something they could answer it and they were looking after you and supervising your duties. A mentor is a little deeper; there's something a little less clinical and a little more emotional. There's a little bit of affect to it. I guess that's my answer; I think that the mentor is a deeper relationship that's really about you as a whole person as opposed to you as a worker." Wu joined in, "Mm-hmm. Yeah, the supervisor may give some job for me to do so I try to follow them even though I can—I can say a lot about what I think, but for me the supervisor looks like—sounds like a kind of

hierarchical structure." I responded, "So, you would see that person in charge of you?" Wu continued, "I might be supervised by someone, that means that she always look at me what I'm doing. Kind of a—not a stress, it's kind of the control. I feel kind of always controlled by someone." "I see… Anyone else?"

Kayt thought a moment and said, "Well, although if I were to go back and see if there's a difference between a mentor and a supervisor, I guess the difference between those in my mind might be that a supervisor might be more interested in getting a task done versus a mentor is concerned with ensuring that you improve and grow as an individual in the thing that you're trying to do. In this case, there certainly is that element that I'm being helped not just to complete something, but there's a concern about my wellbeing as a person and as a professional that am I growing in my understanding." Several voices spoke in agreement.

James joined in, "A supervisor, I think needs to really be on top of you in terms of "Hey, here's a deadline" and is a little bit more structured, and I don't have anybody like that in my life, obviously, otherwise I'd be done," he said, chuckling. Wu rejoined, "Yeah. She always when you have a meetings sometimes you also talk about like personal matters. Like I am the only son of my parents so she also ask my—about my family; how they're doing and all these things. That makes me feel like more comfortable." I said, "Ah, so there's a personal component for you, Wu?" "Yes, for many of us International students she make it so we can talk with her about anything since we are so far from home." I said, "Well, that makes sense to me. Any other thoughts?"

Andy joined the conversation with, “Well, when I think about my faculty mentor, I appreciate that really, the comfort that I can talk to him about anything. I think part of academics and being a graduate student is intellectual vulnerability. I think we’re forced to talk about our ideas and conceptualize the way we think. That can make you really vulnerable. To be able to do that in a very safe space, I think is really tremendous.” Voices raised and individuals around the table agreeing with him.

Kelley shared, “Thinking about my mentor, I guess that I know that she’s always—I mean for lack of a better phrase—has your back, that is going to be professional in spaces and be able to justify and articulate what it is you’re doing and why you’re doing it. She’s not gonna let someone kinda disparage your practice without actually having to back it up.” James responded, “I love the balance that she has between really making me feel like I’m doing good quality work and championing my cause, but also being critical and making sure that I’m being rigorous. I’m not coddled but I’m championed.” Murmurs of agreement crept around the table.

Wu rejoined, “How can I say? We just say the Doctor’s mostly my academic mom *[laughter]*. She said these things frequently to all of her students, so she made a kind of family tree, and who is our academic sibling. It is not just a research meeting. She said, ‘You can bring anything to me, so we can talk about your research work or your personal life in US.’ She just make the strong relationship with her students, especially me. At that time, I was only one of the full-time students under her supervisor.” Andy commented, “That’s interesting

because my mentor is not like that. He's there as your friendly advisor but not as your buddy. He's nice. Everybody's been over to his house. He'll throw a party once a year or something and invite people over. He's friendly but he doesn't want to be involved with your personal life. He doesn't want you involved with his."

Kayt spoke up, "There is one thing that we have not talked about that has been really important for me! I can't tell you how gratified I have felt when she has taken me to conferences and introduced me to colleagues of hers who have the same or similar interests to mine. I mean, if she weren't proud of my work, would she introduce me to people and encourage me to work with them from other institutions?" I said, "So that is important to you?" She responded, "Oh, yes! Working with people from other institutions brings new ideas and new ways of thinking about things and that expands my horizons!"

"Does anyone else have anything else they'd like to share?" I asked.

Cheryl spoke up and said, "I do just wanna say I know that I'm talking really positive about our relationship, but it comes with lots of negotiations and lots of tensions. I mean two weeks ago we had to sit down, and I was like, "Something I'm doing I can tell is bothering you." We had to like talk that out. Last night on the phone at like 2:30 in the morning when we're trying to finish our chapter, I was like, "I don't care. Just make a decision. It doesn't matter to me anymore if you need to put that citation in." Then it's like okay. I think that's what's great, is that it is filled with respect and all of those things, but also

tensions like any relationship." Everyone agreed that they are not all perfect relationships but that on the whole, the positives outweigh the negatives.

Assertion 1: "Advisor" implies something business-like, like a manager in a hierarchical arrangement where the control remains with the advisor. "Mentor" implies a more equal relationship with more mutual respect. The term even implies family-type relationships; especially for international students. Most student participants believed there was a personal connotation to the mentoring relationship; however, they did not necessarily consider it a "friendship" or necessarily involve a relationship outside of campus. Certainly for some it did, but not for all of them. All of the international students who were interviewed wanted there to be more of a personal relationship. With cultural issues to also overcome they were grateful if their mentor at least understood their challenges and helped them to grow. One shared, "I mean to say like I actually rely a lot on her. Even outside research if I have some problem with anything else actually I always go to her for advice and she always advise me well and she help me out a lot in different parts of my life.

Some felt that the mentor actually played a dual role as supervisor and mentor. They felt that you could be a supervisor without being a mentor, but you could not really be a mentor without being a supervisor. And some students even felt that because their mentors did not push them, they floundered even more and secretly wanted some "push." One shared, "No. Well, sometimes she does. Sometimes she does, because when it comes to the feedback aspect, she is a little bit more "Hey this is what I'm looking for." I kind of give her what I, what I,

what I'm thinking, but then she'll come back and say "Let's tighten this up a little bit" or "Let's expand a little bit more on this" so she—I guess she does kind of do a dual role."

Mutual respect was important to the students. "Yeah, so even though I get a lot of advice and good thing from my mentor but she—[Name] is my mentor, so she always try to respect what I think. If I'm in the wrong side she just try to make me realize what's wrong and what is the correct things. Then she try to give me the kind of guide for me to go to the right side." Another shared, "Definitely, because again like I said I think a mentor is kind of like a sounding board. She never tells me "I want you to do this, this or this." She really does allow the creative process to take place with me. She is very patient with me in regards to allowing me to process and giving me that process time. She more or less just kind of guides me. She asks questions. "What do you want to accomplish?" and kind of sometimes offers suggestions as to here's a route you might want to take."

Assertion 2: Doctoral students are intellectually and emotionally vulnerable primarily due to power differentials. Doctoral students are vulnerable because they are dependent on other people to agree to their advancement or not. It is not just learning a whole new domain of knowledge, it is all of the unspoken things they are trying to navigate. One student shared, "Like an example, I know that for a time we had somebody come in from another school. They were here for a few years. They were very well thought of in the academic community, but they were like oil and water with the people in our department. I felt that they were really harmful to a lot of students. In my case, for

example, I had to take a number of courses from this exact same person. They pushed out all the other professors and said basically nobody else can work with these students that are in the program except for me pretty much. Then this person would do things like say I'm not comfortable with what you've done here, and so you're going to be potentially kicked out of the program unless you do X." Fortunately, that faculty member left the university and these students were able to select new committee members. This is, fortunately, not widespread.

Another shared, "I think part of academics and being a graduate student is intellectual vulnerability. I think we're forced to talk about our ideas and conceptualize the way we think. That can make you really vulnerable. To be able to do that in a very safe space, I think is really tremendous. I think that's really great. I think because I feel a connection with him on a personal level I feel like I am more able to open up intellectually."

Assertion 3: Almost all of the doctoral students in this study emphasized the importance of having a "safe haven" or "got your back" relationship with their faculty mentor despite the usual ups and downs of normal relationships. They longed to know that their mentor was an advocate on their behalf, that they were not alone in the process, and that they would help them gain confidence through problem solving along the way. Their faculty mentor was a role model. They liked having a person to talk with that would not automatically judge them and they were very pragmatic and knew that no one is perfect. "Even if it's not completely thought out, I can take it to her and I can bounce ideas off of her. I can also make mistakes and then come

to her and say—which is really nice because you don't just feel like you're performing all the time. You can say, 'God, I didn't even think about that,' or, 'You're right, I didn't answer that e-mail you sent me.' It's nice to be able to admit that you have a lot of faults as well."

Most of the students considered their mentors a role model. One shared, "Someone, whose leadership position advises when necessary, is there to be consulted when necessary and whose encouragement is not overbearing but also not distant; someone whose own professional demeanor and production is a model to follow." She went on, "A supervisor probably fulfills pragmatic and practical roles. A mentor would be somebody that someone like me would want to emulate or in some way think of as a role model maybe, without the kind of notions of hero worship that go with role models."

Assertion 4: Doctoral students felt gratified when their mentors began to introduce them to colleagues outside the institution and encouraged them to form networks that included colleagues of their mentor. In most cases, this was either the ultimate reward or one of the things students most longed for. One student expressed it this way, "She's the best thing; there are so many highlights. I think that she sees a lot of me in her and I see a lot of her in me. We're just kind of on the same page whether it's about work and research or whether it's something more personal. I would say a close kind of second is I love the balance that she has between really making me feel like I'm doing good quality work and championing my cause, but also being critical and making sure that I'm being rigorous. I'm not coddled but I'm championed."

Vignette 2: Guidance, Intellectual Freedom, Self-Reliance, and the Scholarship of Discovery

Monica and Patti were sitting at a table on the upper patio at the Memorial Union one day discussing their respective faculty mentors. Patti asked Monica what her definition of a mentor was. "I would say it's sort of an apprenticeship more than anything. A person who has the experience to show you how to get a PhD and that can basically walk you through a template. Obviously, she won't know everything about my particular topic, but this is how a proposal should look like, this is how you should think about hypotheses, this is how you should be thinking about your analyses, this is how you should be thinking about the scientific method in terms of our department. Then to help you get those grants off and then to even maybe help you then get a job afterwards, which some people maybe don't, I guess. I used to think, when I first came here, that this also included somebody to help you get funding in terms of tuition waivers and all this. Over the years, it's really changed to a sort of mentor of the intellectual process to get a PhD."

"Is that really what you are experiencing?" Patti asked, "Because I don't think mine even fully appreciates, for example, that like my husband and I moved out here specifically to go to this school so that I could work with him. He's truly become now a signature. He's a signature. That's really sad, but that's what's happened. What I discovered over the years is that I would hand him something to read, and he would only read like the first page and a half. What I discovered is I had to get other people onboard. And then I handed something in. All of a sudden,

he read the whole thing. When I hand stuff in for them to read, I e-mail it and I cc my other committee members on it and I send it to him. Because I think he sees somebody else onboard then that kinda makes him do his job, for lack of a better word. Much of the time he's not even around. He was only supposed to be on sabbatical for half a year, so what he did was just informed his students post facto that all of his classes would be online. They would be doing them through e-mail and Skype. The department, actually, it took them a while to figure out he was gone."

"I'm so sorry, Patti! That's not how it is supposed to be." Monica continued, "He's supposed to be the person who shepherds you through the process; someone there who's the intellectual guide. Somebody who helps you, not just with ironing out the—sort of the informational concerns of your paper, your dissertation, your research—but also guides you through the whole process of academia. Because as I'm learning more and more, there's a lot of dimensions to it: the job hunt, the publication expectations, the sort of collegiate atmosphere. These are all things that we need cues for. Of course, despite that, we still have to take the onus upon ourselves because we have the intellectual freedom to manage our own progress. I chose my topic, I've chosen my question. She's given me some guidance in terms of how to lay out the literature review and the methodologies and what not. Again, she's just offered suggestions and if I choose not to take them, I don't have to. She's totally fine by that."

"Well, my mentor does not provide me with much guidance," Patti continued. "There was this lack of certainty about what to do, and I'm not sure

how that gets overcome. I might say, 'Here are two options. What do you think we should do?' That person would just be uncertain, and even though he was really good at critiquing other people's work, in terms of being able to create research at a high level and know what decisions to make, I don't know, just for whatever reason he doesn't have confidence in his own ability to do that and to advise me in that role." "Oh, my gosh! Patti, I didn't realize how fortunate I was! I get so much quality guidance from her! When she gives me feedback, they're real comments. She doesn't give you just negative feedback. Everything is constructive criticism. She's very open about criticizing you. She's not a touchy-feely person. If it's wrong she'll tell you it's wrong. And then she'll tell you how to make it better!" Patti responded, "Well, I feel like you can go out there and figure it out on your own, but you'd just splash around. Maybe you'd figure it out and maybe you wouldn't. You need somebody to show you by both example and also watch you do it and mentor you through the process, and being there to answer questions. I just don't have that!"

"Well, I think I'm responsible for coming to her when I need something. I think that's just part of being a graduate student; you move from being told what to do to sort of crafting your own experience to some degree. I think my role is to be the best at everything I try to do; to always finish things on time, not to make excuses; to accept criticism well from her. I think that's really important. She can't make my topic of study for me; I have to be passionate about that." replied Monica.

"I am more encouraged, actually, by the people I met when I was at Ohio State. When I was at OSU, I had a chance to study abroad. I made a lot of connections. My grad school friends from OSU, we stay connected on Facebook. For example, I knew James was graduating soon, so I would send him notices about jobs and he would send me articles. It's been more of this online—I have a friend who was at Leipzig, and she has a job in Spain. I have a friend in Nicaragua. It's an online peer community," added Patti. "They illustrate the kind of future that I could possibly have within the field. My colleagues demonstrate their scholarship and support, and fellowship and encouragement in a way that demonstrates that you can be competitive but still be empathetic and part of a group of fellows." Monica said, "I can see where that is an important group to have in your situation."

She continued, "I also think it is a mentor's responsibility is to provide intellectual guidance, to—I think in some ways, and maybe this is not true, but I feel like in some ways his, an advisor or a mentor's job in this capacity is to really make sure you have opportunities to publish. Some people work with advisors who they work really hard and they do data analysis and they write introductions and they do lit reviews, and then they don't have the opportunity to be an author. I feel like that's really not fair. When you provide a true intellectual contribution you deserve to be an author. I feel like she has definitely allowed me that opportunity. I mean I have to work for it, but she's at least made it available to me." "It's funny because the project I'm working on, I wouldn't say that it disagrees with his work, but it definitely augments it. He allows me to put it in

there. He says that it is convincing the way that I've styled it. So I do have intellectual freedom there," Patti stated. "I just want to make sure that I have some control of the situation so that I can actually finish and not just languish away in my program forever," Patti stated.

"Well I certainly don't disagree with you there, Patti, but please know that there are mentors out there who provide the kind of guidance you are longing for. I am fortunate to be working with one of them."

Assertion 1: Virtually all doctoral students mentioned guidance through the process to obtain their degree to be vital to their success; they desire constructive and timely feedback above most other things. Throughout my interviews with doctoral students these two issues were woven into the fabric of every conversation. Obviously, based on the fact that one of the main categories of the IMS used in the quantitative component of this study, guidance is one of the pillars of what students need from a mentor. This study supported the importance placed on guidance in previous studies through the interviews with doctoral students.

Here are some of the comments doctoral students shared:

"Someone that guides me through a path that they already worked through, that I can certainly look up to."

"To guide me through that. She has gone herself through, and she has guided others, and they are all top. Whatever they are doing."

Right, so even though [his mentor] they gave me the kind of small tiny advice where she can give you the direction, but the main person — I play the main role as a doctoral student."

"I would say just somebody that is there in terms of guiding me. A mentor is more of a guide for me, or a facilitator, facilitating my learning, my understanding and the process that I need to go through. Allowing me that creative process."

"I think really a mentor needs to be somebody that's going to walk with you through the process of becoming a biologist or a scientist. I think a lot of people don't do that. Mentors just sort of let their students languish out there in the void of their research, and just watch them fail or watch them struggle."

"Well, really, the primary role is the role of guide, I guess. When you learn anything, whether it's science or how to fix a car or just how to pay your bills on time when you're a kid, you need somebody to walk you through the process. You can go out there and figure it out on your own, but you'd just splash around. Maybe you'd figure it out and maybe you won't. You need somebody to show you by both example and also watches you do it and mentor you through the process."

"Right, it wasn't, but in retrospect I should have taken advantage a little bit more of his experience and wisdom, instead of just designing my own things."

The other desire that permeated the interviews was a desire for constructive and timely feedback. By the time students reach the end, there are many deadlines that must be met and many times their very ability to graduate on

time is put in jeopardy by a lack of timely feedback. Additionally, they do not want fluffy feedback, they want feedback of substance. One professor described it this way, "It changes to a certain extent because they get a little more confident as they progress and the assumption is that I should have to say less about the later chapters than I do about the earlier chapters. Less about dissertation chapters than I do about seminar papers and things like that. Yeah, and the more they—dissertation projects change and evolve so much while you're working with them—so once they finally fall into place, then generally students will move forward more expeditiously and more independently once they can see how things fit together. The first couple of chapters are often kind of flailing away in the dark."

They wanted feedback whether it was good or bad; knowing it would make them better. "I guess direct and honest is basically—you know you're always going to get a straight answer from him. It might not be the answer you like. It's not going to be sugar-coated, but you're always going to get an honest answer. It's never a mean-spirited or there's no ill will behind it, but he'll tell you flat if you're doing it wrong, or he'll tell you flat if it wasn't good enough."

Assertion 2: On the whole, most doctoral students believed that it is important to rely on themselves to progress; peer mentors are becoming ever more important. Doctoral students recognize that in the end, they are responsible for their own progress or lack thereof. They know they cannot be passive in the process, so they do not expect their mentor to perform miracles, but they do appreciate a good mentor. One student shared, "I think I've been delayed at least a

year just because I spent years going through this process where I would—you know, I wouldn't talk to people except for maybe once a month and they didn't have—there just wasn't any—I didn't understand how to drive the process." Another stated, "I'm responsible for my topic. I'm responsible for coming up with ideas related to that topic. I'm responsible for executing the writing and the data collection related to that. I don't know. That seems to cover a lot of the things."

They are turning, more and more, to peer mentors and forming graduate student organizations that can provide the support to each other along the way. One grad support staff person said, "They help each other, and they have the camaraderiship, so usually they stick together and take courses together. I would assume they support each other, learn about each other's topics and seek advice on what courses to take and so on and so forth. They support each other when they run into difficulties." Another shared, "We have a grad student community. They have their own Facebook and e-mails, so not only do they get main e-mails from us, but if there's events or things going on they have separate e-mails that they go through that. They have different events that they plan together." And still another, "Oh, they're very good, very supportive of each other. If they see a student struggle, then they find a way to help them. If they can't help them, if that's not their area, then they'll go ask somebody else, because they know other people."

One student shared, "This is not supposed to happen, but I think the people who I shared my work the most with was probably my peers, in terms of actually shaping the way my work worked. In fact, one of the people I probably

shared my work the most with is actually less far along in the process. He's just returned from fieldwork, but I think when it comes to talking about the actual dissertation - when it came to talking about the job search, I've really relied on peers more than anything else."

Assertion 3: Intellectual freedom is very important to the doctoral students studied. Virtually every student interviewed talked about the importance of intellectual freedom for their final product; whatever form that took. Of course, we know that it does not happen in every case, but the students interviewed for this study all had been given intellectual freedom for their final work. Some, in fact, had been given too much freedom and were finding that they were not finishing in as timely a fashion as they could have. Here is the way some of them expressed their feelings:

"Well, the work is mine, right? So the work is entirely mine. The initiative is left to me. I'm responsible for the practical side of it in keeping track."

"I can meet as often or as little as I want, so they let me drive that. They don't—I'm not sure how to answer the rest of that because by the time I started working with them I had already chosen my topic. I'd already done a lot in those areas. They haven't pushed me out of that at all, so I came in with the freedom to pick my topics and choose the way that I was going to—I had already worked with some other people to come up with some ideas and what to put together or how to do the data collection for different things, what they really use. They just allowed me free reign to select all of those things and do all of those things, and even to select which journals we're going to submit our papers to and target as we

put them together to make them either more rigorous or less rigorous." When asked how important that was, he continued, "I'm not sure. There are pros and cons."

"I mean, he knew about it and I don't think he ever disapproved. I changed my topic quite a bit from my MA to my PhD and he was fine with that. I think he does push me academically. Anytime I wanna try out a new idea or a new theory or something he makes me work really hard to justify it to him, which I think is helpful."

"Even like I've had to apply for grants to get that funded and they have always been willing to review the grant application or provide a letter of recommendation. I just applied for more funding to do data transcription and translation. He was very supportive of that."

"I definitely have the freedom to pursue the dissertation that I want. When I was working with my previous advisor, she one time made a comment of, oh, you could use this data for your dissertation. I thought, I don't really want to use that data. It really surprised me that she even suggested that knowing where my interests were. I think he's definitely given me the freedom to develop my own interests. One of the conversation we had, cause it was a little bit difficult to tell my old advisor, oh, I'd really like to switch and have [Advisor Name] be my main advisor."

Vignette 3: Joint Publication, Scholarly Identity, and the Scholarship of Integration

He was running late and figured they would already be at the table. Sure enough, as he walked up they were all there. “Hello, Ladies!” “Hi, Bill!” they all said in unison and then laughed. “Everyone got their coffee?” he asked. “Looks like everyone is all set. What was I interrupting?” “Oh, we were just talking about having the opportunity to publish with your faculty mentor,” said Linda. “My mentor is busy, but I feel like she always kind of finds a way to make time when it’s critical, but I don’t really have a place with her in her research. I never ended up co-authoring anything with her or working in a lab group with her. In the end it seems like it hasn’t really mattered that much, but I hear that’s something that a lot of students do and I certainly haven’t,” she shared. “I understand that,” said Bill. “I have a great mentor, but I wish we could be a little more oriented toward making sure the work is publishable in “A” journals as opposed to simply something that can be completed for a dissertation or completed for a paper.”

Carrie joined in the conversation, “We’re working on a publication now and it’s going to end up leading to a couple more publications. It’s him, another professor and myself. He said okay, he’s the first author on this one, but there’s a couple more coming. He wants us to choose which ones we want to be first author on and lead that. Not only is he saying here’s this opportunity, but I want you to choose which one you want to lead and you’re going to take on that role, which is a great opportunity.”

"Oh, I wish I had that opportunity," said Linda. "One is just literally writing an article and just more practice with that, but then also, as first author you are responsible for interacting with the editor of the journal that you're submitting to, responding to reviewers. Then once you get reviews, it's your responsibility to begin the revision process if it's revise and resubmit. That will be a great experience!"

Linda shared, "I almost long for – I mean not that kind of imposition, but to have someone that would have said let's publish together, let's present at conferences together." "Yes," said Carrie. "He's really great at just saying look what you do have. You'll get there. I think he encourages me because he sees the potential. I think that just helps when someone believes in you in graduate school." She continued, "I really feel he's a wealth of knowledge and it's a great privilege to work with someone like that. I think the personal side of it is that he is so willing to include me on projects and ask me for what I think and listen to and value it."

Kathy, who had remained quiet until now said longingly, "I never worked with a faculty member on a research project. I was never mentored through research or methods and that kind of, 'here's my data. Let's sit down. Let's go through this. Let's see. Let's write it up.' Never. I feel like part of that has contributed, in a small way, to the floundering that I felt as I wrote or am writing my dissertation." Bill chimed in, "Boundaries can be restrictive, but they can also be guiding. I think it took me a little bit longer to find my footing, to find my dissertation topic because I didn't have sort of a corral to go through, so to speak,

but it worked out in the end. It was a circuitous route to where I am today, but it was worth it."

"You know, there are lots of things we have talked about since as long ago as our orientation into the department," Carrie said. "You know, it's a fine line our mentors have to draw between telling us what they would do and helping us figure out what we want to do and get it done. But if we knew what to do we wouldn't be asking!" "Yes, that whole scholarly identity thing!" Kathy pointed out. "That encompasses knowing how to send out articles to journals for publication. It encompasses knowing how to write a grant proposal, or write to apply for a fellowship award. How to choose your dissertation project, particularly how to get ready to go onto the job market, but it's not something you can throw together the year you finish your dissertation. You have to start well in advance of that. Workshops on your CV, workshops on the letter, mock interviews, all of those things!" Bill added, "My department started talking about those things during orientation; milestones, requirements, sequences of courses, expectations, what the academic career requires, and mentally how to prepare for what is, essentially, a ten-year commitment."

Kathy added, "I was talking to a friend the other day who was talking about his mentor. He was saying that he was very pragmatic about the realities of the academic world. He lays out the options for you early on about where you can go as a scholar within both a very high research level or a low or R3. He's pretty honest about that. He lays out what you can expect for funding situations for different types of research, teaching expectations, etc. It would be nice and

refreshing to have a fair assessment of the field, the playing field, to figure out which one you want to be in and then you could build your CV that way." Bill added, "I want to say brand myself, how to create a niche for myself when I go on to the job market. You want to make sure that you can tell a story with your work. That's something I've talked with my mentor about."

"Well, what does he think about interdisciplinary work? We do a lot of that across labs and with other universities; especially when we run into a problem with the research and it needs a kind of analysis that is outside our discipline." Carrie pointed out, "But it is not easy to do." Bill answered, "He does, but minimally. It's definitely on the table if you want it. I think he's always said if that is necessary for the work, then that's great. But there's no point in forcing that. I thought it would be more important when I first started, but now I see his point, in that a lot of people try and sort of put that cart before the horse and try and get an interdisciplinary collaboration going, just to do it. It just ends up a mess. I think he's focused on the question. He says if your question requires it, then by all means go out and find it." "I can see where it would be really difficult to construct a question for interdisciplinary work, but with our lab it seems our questions lead to the collaboration, not the other way around," said Carrie.

Linda added, "When it comes to my mentor and my work, I think that she just – she needs to see that I'm able to integrate into academia as planned. To understand the deliverables of being a professor. To be thoroughly familiar with my content. She doesn't really insist on doing interdisciplinary work. She wants me to know my work very, very well. Part of her job is to ask me those

antagonizing questions that really force me to articulate the sticking points of what I do. I think that she's performing those roles admirably," she finished with a hint of sarcasm.

Assertion 1: Graduate students want to be able to publish with their mentors. In many cases, the "hands-off" approach employed by their professors gives them too much freedom to languish in their programs too long or produce work that is not absolutely top quality. "The only thing I would change is I would have liked the experience to work on a project with her, work on a manuscript with her, to do that kind of hand in hand. Now, she's been very hands on with my own projects, but it would have been nice to see her process first hand." This was something very commonly expressed in the interviews for those students not in a lab environment where they would be routinely publishing with their mentor.

Some students expressed a need for more pressure to produce from their mentors who were more "hands-off." As one student expressed, "I would say it's almost a burden. That's what I would say. Now it's important to me because like I have a baby and stuff. I was here for six years before we decided to think about having a baby. I definitely yearned for more structure."

However, they still appreciated that they had the freedom to explore stating, "It's fine. I'm given academic license to study whatever I kind of truly felt passionate about. Since I'm not in a lab setting my time is my time. I'm free to express myself as a person; I'm not just as a student, which I think is important. I really don't feel bound by much. Boundaries can be restrictive, but they can also

be guiding. I think it took me a little bit longer to find my footing, to find my dissertation topic because I didn't have sort of a corral to go through, so to speak, but it worked out in the end. It was a circuitous route to where I am today but it was worth it."

In most instances, even if they felt they would have liked more structure or "push" they actually did not blame their mentors. They blamed themselves for not asking.

Assertion 2: Some doctoral students enjoy relationships with their faculty mentor where there is respect for their personal space and family time. Some also enjoy relationships where there is mutual respect for their research interests. One student reiterated, "Again, I have a—I feel like I had this wonderfully unique experience, because he was very protective of my and his time outside of school, so we never talked—oh, I won't say never—almost never talked on the phone or through e-mail on evenings or weekends, ever. Like that was that's your time to have your family time. I happen to know other students here who do not get that kind of protection. They get it's expected that they'll work over the holiday break. It's expected that they will answer phone calls on a Sunday morning. I mean, it's a very different experience than I thought."

One doctoral student expressed his appreciation for simply being consulted about his research interests, "Well just that in my case my advisor is pretty good about being respectful of my time and my—also my time and also my sort of inclinations. Like he's not asking me to do stuff that I would not—you know I mean he tries not to. He obviously sometimes will ask me to do some—

you know grading or whatever that wouldn't be super fun. He would like tell me to do that. He tries to kind of take that into account I think. Like whether I would hate a project or not, for example. He tries to take that into account. I've seen other advisors—or I've heard through the grapevine that other advisors don't do that. They're just like, 'Well you have to do this project.'"

Assertion 3: Development of the scholarly identity is rarely, if ever, discussed directly, but it is groomed through scholarly example by the faculty mentors and groomed along the way through proper coaching, and even peer mentoring. When asked if her mentor ever discusses development of a scholarly identity, a student responded, "Yes. Maybe not so explicit as sit down to discuss it, but practices helps me practice and supports my practice of moving toward or residing in that place." Another student responded, "No direct communication. In all fairness, I don't know if that's just because they're still trying to get me through my proposal from their perspective. I'm not writing up a dissertation." So while there does not appear to be much explicit attention paid to the subject, mentors do give students direction as one expressed, "More or less, yes. She said the kind of work you're really interested is this and here are the theoretical approaches that you need to investigate to do that, and the kind of work you're doing is new and cutting edge, so you are going to have to do some interdisciplinary work, you know, those sorts of things."

One grad director spoke of professionalizing the students this way, "That encompasses knowing how to send out articles to journals for publication. It encompasses knowing how to write a grant proposal, or write to apply for a

fellowship award. How to choose your dissertation project, particularly how to get ready to go onto the job market, but it's not something you can throw together the year you finish your dissertation. You have to start well in advance of that. Workshops on the CV, workshops on the letter, mock interviews, all of those things. I would say publication and get a job are the two."

One student did speak of her mentor and their communications, "She really has frank conversations with me about the reality of being a professor at these sorts of institutions. I would say by helping to connect me. She's the one who championed that I should be an IGERT fellow and that fellowship has opened lots of doors. She encourages me to go to lots of international meetings which I'm very privileged to be able to do through that, and promoting me when I apply for fellowships and grants and things like that. She really believes that I'm doing good work. I believe that she believes that and she champions that. I think she knows I'm my toughest critic, and so wants me to believe I can do what I want to do."

Others have expressed the opposite, "No. I've had that conversation in other contexts, you know, in the first and second year seminars that we had as part of the program. I think we had a lot of visitors come in who talked to us about that topic, and so I think I've had some good guidance on there, but my current mentor hasn't had any discussion of that with me." Some even said, "I don't even know what that is." Another expressed, "I don't think he's thought about a scholarly identity. I don't think he thinks that way. I think he thinks more about — he's had

this amazing diverse career and it's been driven by his interest, not by an identity." She was not saying it in a negative way; simply stating a fact.

Some mentors pay a lot of attention to development of the scholarly identity, "She actually encouraged us to present that and I was selected from my group to present our subtask work. I presented both of them over there. I found it very encouraging to me to feel like I am doing a very interesting work and to present totally to different people and who are actually very well-known people in our field. We feel very encouraged. We are doing very good work."

Assertion 4: Interdisciplinary work can be artificial or a natural outgrowth of the research question. For our sample, the professor's leadership is critical to these efforts. One student made a statement about the importance of interdisciplinary work this way, "Oh, because I just think knowledge is so easily codified and unexamined when we are insular about who we interact with and what we use to inform the way we view the world. I guess it ultimately goes down to the fact that I think that we become more critical and self-reflective when we're able to really see ourselves in the face of other people, so to take that and think about what it means in terms of knowledge construction. I had a professor once, Joe Tobin—I mean I give this advice all the time. He told us one time in class, 'You're at a party, you're in a room with 50 people and 49 of them are studying the same thing you're doing, and there's someone doing biomedical research in the corner, you seek that person out. They are going to be able to open your mind and see your topic in a way you never thought.'"

This is good advice, but not everyone believes in interdisciplinary collaboration in the same way. Some mentors really encourage members of their labs to seek out interdisciplinary work as seen in this statement, "It's very specialized field. We found like it is probably very important for us to know about this. She actually not very sure of that, like how it should work. At once she contact one of her friends who actually kind of like pioneer of this field. He and she is very good friends so she always—he already said like, 'Okay, it is very interesting project you are having, just send me your samples, I will run your samples and I will solve this problem.' She's willing to step outside her comfort zone and collaborate with someone who's more of an expert."

Others feel that it is not appropriate unless the question calls for it as we see in the following, "I think he's focused on the question. He says if your question requires it, then by all means go out and find it. But to be truthful, a lot of your questions in organismal biology will not necessarily require—so why force that? If it comes that you want to go down to another level or you can incorporate something else into it, that's awesome. At first I was resistant. I said, well, no, you should be more, I kind of bought hook, line and sinker that you need to be interdisciplinary, but the more you think about it, the more you go, it's really difficult. Those questions are so field specific, that trying to cross those boundaries is just—I've had other grad students that have tried to do it and it's just been a disaster." This statement held true for the less naturally collaborative disciplines.

Vignette 4: Scholarship of Teaching

"Hi, Tom!" called Casey. "How are you?" "Well, I've been better," he said. "I just finished my first TA." "You got a TA? Weren't you thrilled?" she responded.

"Basically they dropped me in and said, 'Here, develop a syllabus; teach this course.' And I've got 200 students in front of me. It was sort of like, sink or swim!" Tom continued, "I really don't think that… I'll be really candid; I don't think they value that here. It's an R1 institution first. When you go up for tenure, they told me they are only interested in one question and whether my numbers in that one question are correct. As long as you're not a terrible professor, as long as your students don't hate you, and you publish, that's kind of the message, then you're okay."

Casey thought a moment about what Tom had said. "It's hard for me to comprehend that since I am trained in Curriculum and Instruction. I know teaching is not valued as much in other disciplines, but I don't believe it is as pervasive as you may think based on your recent experience." She continued, "I think the most important thing in teaching is co-constructing the learning space with your students, whether that's faculty, whether that's students, whether that's other professional staff. I'm very much about planning and having laid out the curriculum, but just being able to, in the moment, switch or change or be – what's that thing when you think in the moment? What's the word? Impromptu!"

Tom responded, "I often get asked about what are your teaching strategies and such, and I haven't ever seen any or read about any." He continued, "This

was an online course with 200 students and my problems were dealing with this massive amount of information. Every day there were hundreds of e-mails – or it seemed like hundreds – and students started freaking out because the Internet doesn't always work. I did get some help from the department and some tips for dealing with that, but I never got any feedback, so I have no idea what the students thought." Casey shared, "We've had a couple workshops on philosophies of teaching and different strategies for effective classroom management which, I have to say, I could see working a lot better outside of that kind of teaching experience with 200 undergraduate students. It's sometimes difficult to implement some of these things. But maybe we could work together on some of these things so that you feel more prepared the next time you go to TA."

Tom thought a moment and added, "I want to be a professor. I actually like teaching very much. I also would like to be in the research field because I feel like in any research field you have to always be linked with the current research to stay at the top of your game. I think if you're in research directly, you have the best opportunity to have those connections." He continued, "We don't talk about teaching at all, which is probably a shame because my mentor is a really good teacher, I think."

Casey went on to share, "I think probably the most I've ever learned was from being in other people's classrooms. People don't necessarily have very articulate ways of describing what goes on in classrooms, but for me, it was just so insightful. It was interesting to see that even teachers who don't teach what I

teach and they're really different from me, there's still so much you can learn from the way they manage the classroom and the way they work with students."

"I feel like because I'm being trained to be a researcher that that's the, those are the skills that they're trying to develop and that's not so much the teaching skills. They do give us like a teaching advisor for that, but I haven't experienced that yet, because I taught online," he added. He went on, "They've just developed a new course for all the graduate students who are going to teach online; they now have to take this course as part of making sure that there is consistency across instructors. But that was not something that I did because they just enacted it. But I think it's our discipline; in research institutions, teaching comes really – it's definitely not last, but the priority is very low. I feel like if you're an adequate instructor and adequate teacher, that's enough, you know?"

Well, what do you want to do with your degree once you are finished, Tom?" she asked." He thought about it for a moment. "Well, I mean my goal for the last couple of years has been to find a place in a small liberal arts college that's got undergraduate research but mainly emphasizes teaching and undergraduate research as a teaching technique. I do enjoy the research, but I could easily put out a paper every year, too, and not worry too much about it. I mean I'm more into—I really love the research in terms of playing with the equipment and developing the question and then executing the experiment. I even love the data analysis quite a bit, but I guess the drive to have that, to seek out the hottest, new sort of -- discovery or to be on the cutting edge of the research. It's not really for me. I prefer to just go where my interest take me. If the undergrads

want to work on invertebrates we can work on invertebrates. If they want to work on cows, we can go work on cows. Whereas to be a true R1 person, you need to become like a laser beam and just tackle one question. Just really in depth."

"Well, if that's the case and you do want to do some more teaching, then we had better figure out a way to make it something you will enjoy and feel prepared to do." Casey repeated, "We can work together to give you some strategies and options for your classroom management. I was concerned in the last course I taught that they would find it difficult to make connections to what I was trying to teach them, so for the final paper for that class what I did is I had them all choose a case study in some sort of human environment context – you know like deforestation in Brazil or water wars in Africa, those kinds of things. Then I had them choose three theoretical perspectives from three different research traditions. Their assignment was to ask themselves from each of those perspectives, what would be the most important questions that the research tradition would ask and what kind of answers would they generate and to kind of reflect on the way you approach a problem limits or defines the kinds of questions you can ask and answer. I wanted them to make broader connections."

Assertion 1: At first it seemed that there was very little emphasis on teaching, but as the research progressed it was found that some do take teaching quite seriously and even enjoy teaching. Outside of the humanities disciplines there is very little formal training in teaching. All doctoral students were asked about teaching strategies and teaching literature in their disciplines. Most did not know what I meant by a teaching strategy and virtually none outside

of the humanities had any literature to which they could refer. Most had just been handed their TA assignments and set loose. Some were fortunate enough to team-teach with their mentors, but that was not common. It took really having the desire to teach for them to seek out programs such as Preparing Future Faculty, etc., that are available through the Graduate College.

After being asked if his mentor ever asked him to reflect on his own teaching practices, one student put it this way, "That hasn't come up much. I've been his TA a time or two. The first semester I was his TA I didn't do any teaching—or I might have did one—I did one course of teaching. This semester I've—I think he's gonna have me teach a little more. He's had me doing grading and things. I think I'll pick up a lot from that. We haven't talked too much about it like that. Sometimes we've sat down, and tried to figure out what went wrong in a class. Like if he felt the students weren't engaged or whatever. Actually I would say, maybe yeah, I just didn't see it that way until I kind of worked it out in my head just now."

Others actually do like to teach and want to remain in research as in this excerpt, "Yeah. I want to be a professor. I actually like teaching very well. I also would like to be in the research field because I feel like in chemistry or any kind of like research field you have to always be linked with the current research work. I find if you're in a research directly you have the best opportunity to have this connection. Then you can develop your idea like whatever the current research you are doing to get it to the cutting edge level." Another expressed it this way, "He enjoys teaching as well. I think he's always been a big proponent of

improving your teaching skills. He would never use the word self-reflection, but he's definitely about practice. He says all the time, you gotta practice, practice, practice. That's self-reflection. You practice once, see how you did. Practice again and get a little bit better. In a more indirect sense he's very much about self-reflection."

Assertion 2: There is an interest on the part of some of the doctoral students studied to leave the R1 institution for a smaller, more personal institution with more emphasis on teaching and less on research. I would be remiss not to mention that not all of the doctoral students interviewed felt that their place was with an R1 university. Some just philosophically felt that there was not enough emphasis for them at an R1 institution on teaching and they believed that they truly wanted to be teaching. Some feel this way because their priorities have changed over the course of their doctoral studies, "Well, my first year, I was gonna be one of the greats. Now, I don't know. It's an interesting question in the sense of what do you see your role is in the discipline? My ideal job now would be to get into a small university, maybe something like NIU, Master's students only, or even just a four-year institution. I might even teach at community colleges. Have the ability to do research and live my life. I'm at that point." This student had spent so long in her doctoral program that when she finally decided to start a family, her priorities had changed.

Some just found out that they truly loved to teach, "Well, I mean my goal for the last couple of years has been to find a place in a small liberal arts college that's got undergraduate research but mainly emphasizes teaching and

undergraduate research as a teaching technique. I do enjoy the research, but I could easily put out a paper every year, too, and not worry too much about it."

Still others do want to remain in the R1 environment and mentor new scholars as illustrated by the following, "I want to be a professor, too. I would like to work in an institution where I could shepherd graduate students. Like, not trying to reproduce myself or anything, but I think it's a good way to keep in the conversation. To have these budding new scholars who are interested in new projects. Interested, and have a fresh perspective. There's sort of an eagerness that comes with trying to design a project.

In the following chapter I present evaluative findings that were incidental to the study at hand that are considered by the participants to be "what works." Following the evaluative findings, I present a discussion and conclusions by research question.

CHAPTER 5

DISCUSSION AND CONCLUSION

So, the question remains, in this journey to the doctorate, how can we implement a more explicit pedagogy?

This study has provided a glimpse into the journey to the doctorate and how different departments facilitate that journey for their doctoral students. As a result, there emerged from the study a number of practices that have brought the participants in this study to the point of completion of their degree. These evaluative findings that were incidental to the research study bear enumeration. They relate to five stages of completing a doctoral degree, (a) recruiting and funding doctoral students, (b) orienting doctoral students to the program, (c) early graduate student career and development of the scholarly identity, (d) learning to become mentors, and (e) completion and the job search.

Following is a discussion of "what works" from the doctoral student's perspective as well as the perspective of those who support graduate students on a day-to-day basis. These perspectives go beyond the relationship between doctoral student and their mentor, one of the purposes of the present study, to the universalities of the doctoral student experience. Most of the practices discussed are not discipline-specific and could be adapted for departments across campus.

Community

In general, one of the most frequently mentioned desired characteristics, and most complained about if it was absent, was a strong community within the department. Students benefit from the close support of their department. "They go

out into their direction, but we're still watching them. I mean we look for needs. We do—after they've been here for a—they have to do their comprehensive exam on their fourth semester that they're here. Like the third semester I have a big lunch where I bring in the Graduate Program's Chair and another member of the Graduate Program's space so that they can ask questions about, 'How do I—what kind of questions are going to be asked,' mainly." Students who felt the most confident about their ability to complete their program indicated that they were close to their faculty mentor and believed there to be a high degree of collegiality within the department. Some students expressed surprise that they could be in a department that was so competitive academically but still feel so supported personally.

Recruiting and Funding Doctoral Students

Virtually all graduate support personnel mentioned that they would like to see doctoral students move through their programs more quickly. "I would like to see them move through more expeditiously. I would like to see us be able to reduce their teaching load. Although we did reduce it just a couple of years ago to three courses a year. I would like to get it down to two a year. I don't think there's any hope of that in this economic climate. I'd like to see us be able to offer stronger [financial] support." Funding issues plague doctoral students from RA/TA support to attendance at conferences, to anxiety over continuing support. In some departments those commitments are made up front with the understanding that the student must maintain adequate progress toward their degree. "You have to show good work and be making progress in your program,

but as long as you are, post Bachelor's coming in, you're guaranteed five years of funding, guaranteed. Post Master's coming in, you're guaranteed four years of funding. They will find money." Anxiety over the current economic climate contributed to doctoral student frustration.

Orienting Doctoral Students to the Program

When new doctoral students come into a program, they want to know what to expect. There are many programs that do not have a formal orientation for their new students. If the graduate student has a TA or RA position they do receive training from the Graduate College. But the students want to know what to expect and how things work in their own departments. Several of the departments represented in this study do provide formal orientations for their new graduate students. Students from those departments were among the participants most satisfied with their doctoral experience. A graduate director shared, "They give them written documentation on our handbook. We have a—I don't know, it's gotta be like a 60-page handbook on the programs, and that includes everything. The handbook has information on getting admitted, but then all the way through completing your dissertation."

Another shared, "In the handbook, there's local information, the light rail, that kind of information, and then information on the Graduate College. Our graduate director does a really nice job, I think, of constantly sending out notifications about GPSA events and Graduate College events. I went to all of those as a student. I went to every—you know, preparing future faculty programs and workshops on your CV and interviewing for a job."

As previously mentioned, graduate students depend more and more on peer mentoring and participation in their own graduate student organizations. They not only derive peer support, but learn the culture of the program from those who have been in the program longer. A graduate director explained, "The students have their own graduate student organization, which has been quite active. They plan happy hours, they plan professionalization seminars, and I—there's a graduate advisor who works with them. I work with them on setting up various workshops and making suggestions. I've done several of the workshops, and our faculty members have done workshops. When something crosses my desk that I think—we've been reading applications for various university fellowships, I realized that many of our students don't have a clue as how to write a grant application. I said to the president of the graduate student organization, 'Listen, we need to have a workshop, in grant writing and applying for fellowships and things like that.'"

Additionally, departments try to provide a space for their graduate students to use. These spaces come in many forms. Most of the departments separate the social space from a work space if they have the capacity to do so. They recognize the need for new students to have the option to leverage the existing community of graduate students to fit in. It not only benefits the students, but the department benefits because the students have the resource of their own community; especially at a time when the economics of many educational institutions are causing attrition rates that put pressure on graduate support staff to support greater numbers of students with fewer staff members. One department

described their student space, “They have a lounge which is right there, in which they have just refurbished, its much nicer than it used to be. It's more of a social space. It's got a refrigerator, it's got a coffee pot, it's got some books, I think. Usually when I walk past, there's somebody in there. I would say it's more frequently used. I don’t know the numbers, but sometimes you walk by, there's one person. Sometimes you walk by there's half a dozen. Generally, it seems to be occupied.” In the case of that program, their students are scattered widely across the valley and they have recognized the importance to those students, explaining it as follows, “Well, particularly when some—given the living situation here—where so many people are commuting in from a distance, just to have a place to sit while you're between classes or between teaching.”

In the case of some departments, the graduate students have formed such a cohesive group that they spend even more time organizing themselves and their efforts. “Our students have formed basketball leagues, baseball leagues, and they do one other thing—I can’t remember. One of our students used to be a park ranger, and so she organizes a lot of hikes. We see that the students who want to do that will do that.”

One department puts together rooms specifically to help the newer students feel the benefits of their community and to foster communication. “We have student group rooms. I have a large room upstairs with a lot of desks; maybe I’m going to guess 20 desks cubicles. It’s very quiet and a very—they study. I mean they really use that just to study. We have—I have another smaller room for six. I’ve got a new student room that I painted and found second-hand furniture

for and lockers and everything where—first years because they—so that they can meet as a group. We put up whiteboards, so that they could study together. Anybody who needs that room, I always give them access to it. I think probably all departments have that, but I think ours, we encourage more interaction." This graduate director made the assumption that all departments have these spaces, but, in fact, they do not. One program with a particularly active statistics program describes their space as, "Yeah, there's a huge room upstairs that—I mean, really, it reminds me like of a cafeteria or something. It's very big, and it has, I don't know, 25 computers or something that have— any grad student has access to that room. You're given keys. There's a printer up there. All of the computers have like Microsoft Office capabilities, certainly Internet. They have—I think they all have SPSS. I think they all have SAS. Then a few of them also have Mplus and other programs for more advanced modeling, so it's harder to—you know, 'cause those are more expensive." The departments with the most satisfied students in the current study encourage the building of community both among the students and in conjunction with their faculties. "I feel like the—this is getting better, I think, but it's growing, so it's also a factor that the program's getting bigger, so more students are coming in. They're coming up with more social activities for them. They have happy hours. They have game night. Every month I think they have a game night, where they have Xbox games and card games and board games, and everybody comes and brings snacks or something."

Another student organization believes it is important to build in a service component. "They have like a philanthropy committee, who put together at least

one major event a semester. “Usually toward Thanksgiving or the holiday break, they do something like an angel tree drive or a canned food drive where they go downtown to like Salvation Army type thing. I know that in the spring, they usually do Habitat for Humanity.” “These officers and the committee that they form, they're in charge of putting together the team to go do some Habitat for Humanity things. They also have—they do fundraisers for the Graduate Student Association to fund student professional development and conference travel. They do—I think they've come up with now some T-shirts and tote bags that they have put together. They're gonna try and do—I think they're gonna do a movie night, where it's some movie that is—they're gonna try and team with faculty members where the students can get credit for going to see it. It's something that's gonna be related to development or education or sociology. Then the students get credit, and then going to the movie, they ask like a dollar donation or something from the students who attend. Faculty members support these efforts and some of the funds go to offset the costs of printing posters for conferences, conference travel, etc.”

Doctoral students want to fit in. The process can be isolating and frightening, so these departments encourage collaboration. “Exactly, like how you fit with this bigger program. I think there's an attempt for the culture of the program to be very, certainly very collaborative. Oh, my gosh, that's not even an attempt. For example, in terms of interdisciplinary work, it's just very, very supported, encouraged, interdisciplinary work.”

The body of evidence seems to agree that these community building efforts are important to establishing relationships between the students to facilitate their forward progress and retention to completion of their degree.

Early Graduate Student Career and Development of the Scholarly Identity

The data from this study indicates that rarely is development of the scholarly identity discussed, and in many cases, for our participants, they did not even recognize the term scholarly identity. This held true across many disciplines. There was no apparent pattern for those who understood the term and those who did not which gives rise to the evidence that there is no explicit discussion of the term or the process. Departments do, however, design activities to facilitate the development of their scholars. "Yes, so first of all, our department has the Friday Research Workshop, with either the faculty in our department or the Ph.D. students, senior Ph.D. student or the guest speaker from outside or even, you know, job candidates. Usually, we have a pretty full schedule maybe—almost every Friday at noon to 1:30 we have this research workshop."

In another lab, the workshop is used in a slightly different way, "Okay, so usually we have a lab meeting every week or every other week so sometimes we talk about our research results—and the research work, but sometimes she just—how can I say? We have a curriculum vita colloquium. So everyone should bring their own CV and then she just review and then how we can make the nice-looking. CV, but she also—how can I say? Not only the editing issue, but she also ask us which one should be included in your CV and what is this one's importance, why you should present yourself as a scholar." This PI, who is not yet

tenured, takes the time to work with her graduate students to learn how to present themselves. This takes place not only at the beginning of their career in the lab but all the way through their doctoral program. For example, "She conducted a couple study and then she wants her students to —using the data, to have a presentation or publication. Then if we got accept from the main conference she'd try to support the travel fund. Right, right, so she try to make a good networking system with other colleagues from other universities." She maintains this focus the entire time they work with her lab. She pays particular attention to the unique needs of her international students and helps them to bridge the cultural gaps and learn to present themselves as scholars in their second language. She makes these efforts despite the expectations placed upon her for earning tenure with the university. The students shared that occasionally they sense that she is under pressure but, because of the time she devotes to them, they are motivated to work even harder for her.

Attendance at conferences is highly encouraged in all but one of the departments interviewed. Generally, they are encouraged to present and collaborate, "He's made sure that we attend those every year and that we present something if there's any way possible. He really is highly focused on getting us to collaborate within the building, if possible, with other ASU grad students or researchers. I think he's pretty integrative in that way."

The professors with the most satisfied students are responsive to their individual needs. This is not always possible if they are supervising large numbers of students, but for our participants these efforts have led to their retention in the

program and their expected completion with the next academic year. One international student who was having difficulty with his writing in English shared the following, “I don’t know. He’s helpful in every step of the process. I can always bounce ideas off of him and he’s really good about turning around writing projects and stuff like that. And not just editing—we talked about this—we’ve gone through this where it used to be when I started I’d turn a paper into him and he’d just edit it. He’d just reword things, change things and send it back to me. He kept doing this and I eventually said, ‘Look, this isn’t helping me. Obviously, I’m still making these same mistakes. Tell me what I’m doing wrong and let me fix it.’ We started doing that and my writing has improved dramatically.” The student was grateful because he knew that it took his mentor longer to do that for him, but was gratified and felt that his mentor wanted him to be successful.

One department helps their students to develop from the very first semester. The first two semesters, students are required to complete an independent study each semester. These independent studies culminate in a poster session presented for the supervisory committee members for all of the participating students. Here is what their graduate director had to say, “Okay. They participate each year in that - so that they build their skills for presenting their posters and presenting their research. That, and it’s a way of the supervisory committee, the other two members, to make sure that they’re progressing. It’s another way of making sure that people are doing their research - and that there isn’t any problems and that they know that there’s support. Because sometimes you can know you have a supervisory committee, but you don’t see them until

you do your dissertation or you do your comprehensive exam. Where we try—we're trying to encourage the faculty to interact with the students, so the student is able - feels that they can go to someone else to ask questions if there's a problem. We have a big lunch afterwards." This department prides itself on its collegiality and encourages interaction between faculty members and graduate students. He shared that when he came to interview at ASU he expected something different than what he found, "Say, for example, coming from [his previous institution] say I was expecting a certain degree of rivalry in such a competitive school, you can't imagine my surprise when I found a cooperative, excellent base there." He strives to maintain and encourage that departmental culture.

In one very collaborative department they have established a program where each graduate student is paired with a graduate student approximately two years ahead of them in their program who can answer their questions and peer-mentor them; especially in their early years. They describe it this way, "You know, the first years especially stick together, because they're all new and nervous and they are the "freshmen" on campus. You know? I think that in later years there is a real attempt to get students mixed. We have a student mentorship program, so senior students are invited to be mentors of the younger students. I had one, and actually I still speak with her. We clicked really well. We're actually really good friends now."

Some mentors recognize that not every graduate student they mentor will end up at an Research 1 (R1) university. One of the graduate students shared, "My

mentor was very adamant that you build your CV in the direction that you want to go. If you want to be an R1 person, then you need to spend most of your time publishing data and teaching as little as possible and getting grants. If you want to be more on the teaching side, then you need to be teaching as many courses as you possibly can, getting involved with education outreach and hopefully teaching at the community college, which I did several times. He was very adamant that your CV needs to match what career path you want to go to." This graduate student is presently in the job seeking process and has had four offers for on-campus interviews.

Finally, one of the things that almost every graduate student wanted was prompt turn-around from their committee members. In every case for participants in this study who were unhappy, their work was not being turned around promptly by their mentor and they felt apprehensive and unappreciated. Here is how a student expressed his appreciation, "Oh, yeah, almost immediately. I was really lucky because a lot of people in my department have committees that take a long time to read their stuff, and he is amazing at — I think he had finished — he had read every chapter beforehand, but I think he took less than a week to finish the entire dissertation and come back with really good feedback, so he is responsive, and he gives feedback, very clear feedback, too."

Learning to Become Mentors

One program excels in building confidence for both international and domestic graduate students. It is not available to everyone, but for those students involved in a Research Experience for Undergraduates (REU) program,

satisfaction levels soared. Because they mentor undergraduate students and teach them how to do research in the laboratory, it not only teaches them how to be mentors themselves, but also how to teach. For international students it can be doubly beneficial as one participant relayed, "That's the give-and-take of the REU. Especially I'm an international student so I'm not good at the writing so—English writing—so in that case you can—she told me that you can give some knowledge of this area but they can help you about the writing and the English cultures, stuff like that. You can have a good relationship, give-and-take relationship each other, so that's— I think that's kind of the mentorship process."

The REU experience teaches them leadership, as well. They get to experience that "light bulb moment" with undergraduate students who, perhaps, never imagined themselves working in a lab. "I also have the responsibility to work with some of the undergraduates with me. They're like totally under my control. Part of what they're going to do and what part of the research they're going to do is all upon me. I work with them at least two or three days a week. We have like a common group meeting with my mentor, the undergrad and me for once a month to discuss there's the work they are doing and that's our goal and that's how much we actually achieved so far. It's not like teaching chemistry. Like I give him mix this, this, this, and just see what actually happens…" Another student shared, "Another thing is I found is the confidence. At first I was working in my own project but then I actually have the opportunity, as I told you earlier, to work with some undergrads. There she actually let me handle them. I'm not only working for myself, I'm working with some others. The thing is when I was

working with others I have talked to take care whether they're understanding the things properly, whether they're doing the research properly and all these things. That gives me a lot of confidence."

In another lab, the PI chooses her undergrads very carefully, and with good results. According to her graduate student, "We have very—three brilliant undergrads working in our lab for that project. Two of them actually went to grad school and one of them went to become a doctor. Yeah. We believe that actually working in our lab actually helped him to stay engaged with it. They also working in graduate schools and one of them is going to graduate very soon." He went on to share, "Like she is kind of take them under probation. When she think she or he has a potentiality then she put her whole effort into them to make them a very good researcher."

Completion and the Job Search

Networking and job placement assistance is important, but not always provided. One student shared, "It's not that I'm completely floundering on the job market, but I would've liked someone who's sort of walked me through it a little bit more." "Someone who could actually introduce you to people, or provide introductions?" I asked. "Exactly. I really have missed that." In the case of this student, she really did not get much in the way of mentoring from any of the three faculty members on her committee. She liked them all really well and respects them but wished she had had more mentoring. However, she admits that because she is of Asian descent she would probably not have been comfortable with a very

personal relationship. In cases of the international students, we need to better recognize the cultural issues that can get in the way of a successful outcome.

One participant whose department recently established the Mock Job Search Committee describes it as follows, "Well, first of all we met early in the semester to talk about cover letters and CVs and all the practical aspects. Then we had several meetings where we also looked at the job list. Tomorrow we go through three different formats of the job interview process including face-to-face, Skype, and telephone interviews to give us the experience of practicing the interview. They're led by the professors in the department of [her department]." This practice is certainly not discipline-specific and could be implemented on a widespread basis to assist students who are preparing to be or are on the job market. The efforts enlist assistance from faculty members and are a very explicit way to help them get prepared for a job search.

Other ways faculty members assist their students are described as follows, "Well, encouraging me to put together job market materials, overseeing them, proofreading them. We went through the job list together when it came out. She shared insights for some of the job listings that I wouldn't have had otherwise. She helped me narrow down which of the writing samples I should send off. What have I done is really the better question; that is I've applied for 25 plus jobs and put together all the application materials and sent them off myself. I am part of a job search committee here at ASU so I am seeing that from the hiring perspective; just small, a small role in that. I am part of a mock job search unit that prepares graduate students for going on to the job market." Faculty members and their

insights are essential to the process of being properly prepared during the job search.

Graduate support staff is also important in this process. One person shared, "Our graduate director does a really nice job, I think, of constantly sending out notifications about GPSA events and Graduate College events. I went to all of those as a student. I went to every—you know, preparing future faculty programs and workshops on your CV and interviewing for a job." It worked for this former student who is now employed as an Assistant Research Professor.

Professors who assist their students in establishing networking relationships during their graduate career assist them with the job search from the very beginning of that networking effort. "Yeah, and I would like to say when the first few times she actually take me to different collaborators like, "You want to do this experiment?" This professor or this grouping or this community are also doing this experiment so talk to them. For the first few times… Yeah, to get together on the work. The later part—like right now I know who are actually doing what in the fifth year. Right now I can directly go to them and talk to them. She was always behind me. I don't even need to talk to her all the time. Like I want to do this experiment, should I go and talk to them? I can go and talk to them and then we decide we need to do this experiment. Then I talk to her like I already talked to them and this experiment or design. She's always, 'Okay, that's pretty—She's nurtured that." This student was just offered a Post-Doctoral position in California.

On the other hand, some students are discouraged with the economic outlook and are trying to consider what their options will be. “I’d like to be doing something similar to what professors here do, the publishing and the research — as well as the teaching, but I also think that a lot of things are not possible anymore in this economic climate, and with things changing and different pressures, there’s just fewer jobs out there.”

She went on to say, “There’s more competition. Almost every job that I applied for had over 200 applicants and these are for [her discipline] jobs. You think there’s 200 people out there on the job market for this really specific job? I’m starting to think that what I see as possible will have to change. Academia is changing really fast. I think in ways that are completely unanticipated, and people don’t know how to put their finger on what’s going on, so it’s hard for me to imagine what the future will be.”

Speaking about her mentor, “I don’t think he can do any more than he’s doing. I think a lot of advisors are not really giving their students great advice ‘cuz they’re not really sure. I think a lot of them are pretty uncertain about what’s gonna happen. I’m actually suspicious of people who are giving their students a little bit too firm advice, ‘cuz I just think that’s not completely realistic. I’ve heard other people tell their students, ‘Oh, because you’re doing this interdisciplinary work, you’re the kind of person who’s gonna get hired,’ and I think that’s really not necessarily true.”

Others are considering additional training or pursuing options other than the work for which they have been trained. One student shared, “Yeah, I think

that's — I think at that stage, it's all — I am thinking that I might need to get some more training, or some more education. For example, I noticed a lot of ads are looking at people who can teach online, and I think — that's gonna be the way that a lot of education goes, 'cause it's cheaper."

For international students for whom English is not their first language, the challenges are even greater. "It's not only language, sometimes it's the attitude. Sometimes it's the—do you feel comfortable to share your information with others? Do you—can you overcome the difference in culture? Because sometimes I say something, but I realize this may not be very proper for U.S. people. That I need to change. Sometimes people say something to me and I feel not very comfortable. I need to take some time to accept it. Basically I need to learn the way that people communicate here." This student felt that perhaps his options should turn to industry. "I think one is the attitude, and I think the one is the time. I just need to know more people because sometimes is—the problem is I need to work in the lab—so the people all I deal with is my group members. I only know them. That's very few group of people. I wish sometime later after I graduate I can go to an industry that I know more people and I can learn from them, and I know how to communicate well, how to do such things."

What is Not Working

While this study has dealt primarily with reporting what is working for this group of graduate students, some of the students were greatly disappointed and unhappy with their experience, but too far along to quit. It is important to discuss these issues briefly because for every unhappy graduate student that will

still complete, there are many who probably fell by the wayside and contributed to the high attrition rate for doctoral students.

There are some issues of professors making inappropriate requests of their doctoral students; some of which are cultural conflicts in nature. In one case, a doctoral student was offered domestic work in the professor's home. Due to the cultural differences and the fact that the student looked up to the professor very much, it created a huge amount of discomfort due to the cultural differences. In all fairness, the student was in need of money and I believe that is why the offer was made by the professor. Nevertheless, the doctoral student was extremely uncomfortable.

In another case, a professor gave the student's research ideas to another doctoral student and was much more encouraging and helpful to the other student. The doctoral student interviewed found out about it when the second doctoral student asked for help in the data analysis. As a result, the student interviewed has no trust in her faculty advisor.

An international student in a large lab observed his professor giving a student very good feedback and positive reactions when that student presented positive results. Expecting the same when he presented his positive results, he actually got negative feedback. He was highly discouraged. He was told by other members of his lab that it was because the professor had higher expectations of him than the other students. That information was not helpful to him since the professor made no attempt to explain it to him. Part of the problem may be

language barrier issues, but that is something that needs to be addressed when working with international students.

In one surprising instance, a doctoral student was asked to come to the home of the faculty mentor to remove belongings of a deceased pet. The doctoral student changed mentors soon after that experience, but not without a great deal of turmoil.

Last, there is a professor who runs a large laboratory, and runs it like a company. The professor has the ability to see the "bigger picture" but rarely gets involved with the details at the problem level. In this particular case, the doctoral students are left to figure it out with no guidance on the problem-solving. Communication and teamwork can be a problem in a large lab. Students from large labs complained that they only had access to post-doctoral students and not the lab directors. Of the students in the study, those in small labs were more satisfied with the experience because they always had direct and prompt access to their faculty mentor. In the following section I re-visit the research questions and present my conclusions.

Conclusions by Research Question

Research Question 1. Recall that Research Question 1 was *Is the Ideal Mentor Scale (IMS) a valid measure to assess Integrity, Guidance, & Relationship desires of Doctoral students as they relate to their perception of an ideal mentor at a large Research 1 university?* Given that the interpretation of the Relationship subscale consisted of some items not related to "relationship" and the previous study suggested a poor model fit using CFA (Bell-Ellison & Dedrick,

2008), EFA was conducted first in the current study to explore the factor structure for the IMS again. The results suggested a four-factor solution (Affective Advocacy, Academic Guidance, Scholarly Example, Personal Relationship). Subsequent CFA indicated that the new proposed model performed better than the original one. Further analysis of latent mean differences showed that females placed more value on factors relating to Affective Advocacy, Academic Guidance, and Scholarly Example and less value on Personal Relationship than males. Further, students 30 and older place less value on Scholarly Example and Personal Relationship than do students under 30. There were no differences based on whether the graduate student was pursuing a Master's degree or a Doctoral degree.

Based on factor analytic results, the new four-factor model may be useful for conceptualizing and assessing aspects of doctoral mentoring at Arizona State University and, possibly, other large Research 1 universities. ASU has a number of mentoring programs including the Shades Program, a multi-cultural peer mentoring program. The IMS is an instrument that can help both mentors and mentees identify the characteristics that are most important to them in a mentoring relationship. Using the IMS may facilitate the process of matching mentors with potential mentees in formalized programs. It can also be used to open discussions between mentors and mentees in terms of setting their objectives and guidelines for the mentoring relationship.

Research Question 2. Research Question 2 stated *How do Doctoral students perceive the relationship between themselves and their supervising*

faculty member? Study results found that the term advisor implies an arrangement where the control (or power) remains with the advisor. Doctoral students studied felt that the term mentor implied a more equal relationship with mutual respect as an important component. Most of the students in the study at one time or another felt intellectually or emotionally vulnerable making it very important to them that their faculty mentor provide them with a safe haven where they could flounder during the process of learning the disciplinary knowledge and critical thinking skills to equip them for their future roles. Evidence from the study indicates that guidance by their faculty mentor, acting as an advocate on their behalf, and intellectual freedom for the production of their culminating product (dissertation, research portfolio, etc.) were three of the most important characteristics for doctoral student satisfaction in this group. However, they realized that self-reliance was essential to completing their degree.

The study data also suggested a lack of resources for faculty mentors in terms of professional development in the techniques needed to mentor doctoral students to completion. Results suggest that ASU faculty may benefit from the implementation of a modular training program specifically for supervising faculty. Training may shorten the learning curve for new academics and, perhaps, increase doctoral completion rates through better quality mentoring and supervision. It could be modeled on the University of Sydney Postgraduate Supervision Development Programme (Brew & Peseta, 2004) described in Chapter 2. The Sydney program has developed an online set of modules, similar to the Human Subjects Training required by our IRB, supervisors can access and

complete at their own convenience and to the level of participation they choose. The program has been developed to address the needs of supervision at all levels from beginning supervisors to the most experienced.

Since modules would be self-paced and conveniently offered online, it could provide a growing resource for faculty members that would transcend disciplinary limitations. Since the final module provides the opportunity to have a growing repository of case studies of supervision, it could become a resource specifically related to the culture and traditions resident at ASU. For new faculty members it could be an invaluable resource available to them on an individual and private basis.

In the Sydney model the modules offered cover Preparing for Supervision, First Meeting, Managing the Process, The End of Year Review, Helping Students with Writing, Completion of the Thesis, and the Recognition Module (case study module). I would propose an additional module dealing with Supervision of the International Student. It is difficult to understand many of the challenges faced by international students including cultural issues, communication in a second language, visa issues, etc. This module could encompass all of those issues in a module that would be available for those faculty members new to mentoring international students; or those having difficulty mentoring international students.

Research Question 3. With Research Question 3, I asked *How do Doctoral students perceive their own and the supervisor's role in the process of scholarly identity development?* Results of the study show that this is the least discussed component of the study inquiry, but most important in terms of

completing the doctoral degree. Development of a scholarly identity is a process that should take place over the course of the doctoral student's career. As was discussed in Chapter 2, there is a specific process to role identity development and a salient hierarchy of role identity. One of the critical factors is recognition by others of the emerging role identity. The greater the community affirmation is of the scholarly identity, the more powerfully it emerges in the salient hierarchy. To repeat, how an individual sees him/herself in the context of their social and cultural worlds assists in making sense of one's own life and, therefore, contributes to the emerging scholarly identity. It was evidenced in the students who participated in guiding undergraduate students in the REUs. They gained confidence in their teaching role and began to see themselves as an emerging academic.

Based on evidence from the current study, I propose that there be more explicit attention paid to understanding the development of the scholarly identity for both faculty mentors and their doctoral students. There were a variety of practices in place in various departments that targeted this development. Again, an additional online training module could be developed that could be made available to both faculty and graduate students. The module could be designed to facilitate understanding of the process, the research behind it, and a description of practices that facilitate scholarly identity development. These professional development training resources could provide interested faculty members with new knowledge and techniques. Graduate students could use the module to facilitate greater understanding of what it means to grow into the role of scholar.

Research Question 4. Research Question 4 stated *To what extent is each of Boyer's four Domains of Scholarship explicitly addressed in Doctoral student training?* Data from the study provided evidence bounded by the four domains of scholarship.

Scholarship of Application, defined by Boyer as engagement within and outside the institution, is encouraged across almost all of the departments represented in the study. Networking across institutions is highly valued in the research laboratory environments for research collaboration. In other areas it is encouraged and facilitated with future employment in mind. Evidence from the study indicates that in general, Scholarship of Application is being practiced at ASU.

Scholarship of Discovery, defined by Boyer as research and pursuit of new knowledge, is definitely in practice at ASU. As a Research 1 university, research and publication is pursued with great vigor.

Scholarship of Integration, defined as interdisciplinary collaboration, is pursued to a greater or lesser degree depending on the types of research questions that are being investigated. Some disciplines are more suited to interdisciplinary work than others. Some have a natural interdisciplinary approach, such as chemistry and biochemistry. Others pursue interdisciplinary collaboration when there are methods or expensive instrumentation needed that do not reside within their own laboratory environment. And, finally, some feel that artificial attempts at pursuing interdisciplinary collaboration result in a waste of time and disappointing outcomes.

Scholarship of Teaching, defined by Boyer to include not only the act of teaching, but assessment of practice and continued improvement of teaching through research and publication, is the least explicitly pursued of the four domains of scholarship. There was no specific pattern by department or discipline for who values teaching and who does not. Participants in the study were asked if they ever reflected on their own teaching practices, what teaching strategy they considered important, and what literature existed for teaching practices in their disciplines. Only one of those not in a humanities discipline could actually articulate specific answers to those questions.

With a national emphasis on educating students in Science, Technology, Engineering and Mathematics (STEM), there are efforts underway to better educate secondary teachers in content knowledge and new ways to engage secondary students with the hope that they will attend college and specialize in the STEM disciplines. If the ultimate goal is to draw students into STEM disciplines, it is imperative that when they reach the undergraduate levels they must be exposed to levels of excellence in teaching to keep them engaged. However, if Teaching Assistants (TAs) receive no training prior to teaching undergraduate students in these same STEM areas, we risk discouraging undergraduate students from pursuing STEM.

REUs are beneficial in these efforts to some extent because they engage undergraduates in actual research. There is a new emphasis in some disciplines at ASU on education and teaching for the discipline; for instance, education in

engineering. It is an encouraging practice that could facilitate the retention of undergraduates.

Undergraduate students and their families make a sizeable investment in their higher education. It is important to train TAs teaching in undergraduate classrooms and to equip them with research-based, teaching strategies that have been shown to be effective in the classroom. They need to be familiar with resources even if they have not participated in Preparing Future Faculty or other similar programs. Data from this study indicate that this training is not being provided for the majority of those outside the humanities disciplines. Graduate students who do teach in the classroom, for the most part, want better preparation prior to teaching at the undergraduate or community college level. Training could be provided through online teaching modules. Additionally, it could be provided by expanding courses already in place through the Graduate College. An existing STEM Education course is designed to teach graduate students how people learn and what research says about the most current teaching strategies to use in order to engage students in more effective and longer-term learning.

At the conclusion of the study, results from the quantitative analysis were compared with results for the qualitative analysis for possible convergence of evidence. The first two factors for the new four-factor solution were Affective Advocacy and Academic Guidance. An examination of the qualitative data seemed to agree that these two factors were also most important to the participants in the semi-structured interviews. Participants did mention the importance of Scholarly Example and Personal Relationship, but they did not

indicate that they were nearly as important to participants as characteristics that would be represented by Affective Advocacy and Academic Guidance.

Importance of the Study

Neither the IMS nor the QSDI had been used with qualitative follow-up, although both sets of authors indicated that this could be a valuable and informative use of the instruments.

Anecdotal evidence has indicated that not much open communication occurs between doctoral students and their supervisor regarding development of the scholarly/researcher identity. While there is evidence that there is emphasis on professional identity development in the training of novice teachers, albeit mostly through observation, this emphasis is generally lacking in doctoral education pedagogy. It is assumed to develop on its own over the course of the doctoral experience.

Australian research has indicated that making this process part of the pedagogy of doctoral education can increase completion rates, time to degree, and publication rates (Australian Research Council, 2009). This study strove to provide a greater understanding of this process in ASU doctoral education and lead to recommendations for interventions designed to increase doctoral completion rates and lower time-to-degree.

Additionally, the study examined what worked and what did not work across the various departments for the doctoral student participants to bring them to the point of completion in their doctoral programs. All of the student

participants were either graduating May, 2012, or were within one academic year of completing their degree programs.

Limitations of the Study

This study would have benefitted greatly with faculty participation so that the faculty perspective could be represented. Extensive efforts were made to obtain faculty participation, but in the end, there simply was not an interest on the part of faculty mentors to participate. Even considering the holiday season over which this study was conducted, faculty members could not be persuaded to participate by delaying interviews until after the beginning of the spring semester. Fortunately, opening the study up to a greater number of doctoral students provided a wider perspective of practices at the department level. Future study on doctoral completion would benefit greatly from faculty participation.

Another limitation of the study is that some participants shared that they were nervous about participating for fear of alienating their faculty mentors. This could have discouraged participation by doctoral students who may have provided a different viewpoint for their experience that may have changed the results.

As previously mentioned, there is always the possibility of researcher bias and every effort was made in the iterative activities of data analysis, particularly in the qualitative portion of the study, to constantly check for bias on my part. There is also a limitation when study participants are volunteers due to the special nature of those who are inclined to volunteer to participate in a research study as compared to those who would not volunteer.

Finally, another potential for triangulation of data would have been to plot and analyze participant responses to the QSDI survey and compare the resulting graphic representation of their responses to the data gathered during the semi-structured interview.

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APPENDIX A

SUPERVISOR INTERVIEW PROTOCOL

My name is Pamela Garrett. I am a graduate student under the direction of Drs. Mary Lee Smith, Shelly Potts, and Marilyn Thompson in the Mary Lou Fulton Teacher's College at Arizona State University. I am conducting a research study to examine Ph.D. Completion as it relates to the relationship between Doctoral students and their advisor/supervisor/mentor.

I am inviting your participation which will involve approximately one-half hour to fill out an online survey and one hour for a follow-up interview. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. Your participation in this study will help to improve the doctoral experience at Arizona State University (ASU). There are no foreseeable risks or discomforts to your participation. Should you decide to withdraw from this study, it will not affect your standing at ASU. You must be 18 or older to participate in this study.

This interview will be transcribed by me or a transcriptionist who will not be provided with your identity. All electronic forms of this transcript will be encrypted and any hard copies will be in my possession only. Audiotapes will be kept for three years, locked, in my possession in my home office, accessible only to me, and then erased. Your responses will be kept confidential. Any identifying information will be kept in a separate file, also locked and stored in my home office, accessible only to me, and will be shredded at the same time as the audiotapes are erased. The results of this study may be used in reports, presentations or publications, but your name will not be used and identifying details will be changed to protect your identity.

I would like to audiotape this interview. The interview will not be recorded without your permission. Please let me know if you do not want the interview to be taped; you also can change your mind after the interview starts, just let me know.

If you have any questions concerning this research study, please contact the research team by e-mail: Mary Lee Smith, mlsmith@asu.edu; Shelly Potts, shelly.potts@asu.edu; or Marilyn Thompson, mt@asu.edu . If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know now if you wish to be part of the study.

Did you have a supervisor during your doctoral studies?
How would you characterize your relationship with your supervisor?
Would you consider that person a mentor?

- What did the relationship mean to you?
- What do you see as the difference between a supervisor and a mentor?

Thinking now about your supervisor's style, how would you compare it to your own supervisory style?
What was the best thing about the relationship?
What was the worst thing about the relationship?
Do you remain in contact?

- If not, why not?

How many Doctoral students do you presently supervise?
How many Doctoral students have you supervised over the course of your professional career?
Of those that you have supervised, have any not completed their Ph.D.?

- If not, why not?
- What was the relationship like between you and the student?
- Did they eventually finish under the supervision of someone else?

Now turning to your relationship with your student, how would you describe the relationship?
Is your student making satisfactory progress? How would you describe the progress?
What skills would you most like to see your student develop?
Is this the same for all of the students you supervise?
What does the term "scholarly identity development" mean to you?
Do you ever discuss development of a scholarly identity with your student?
Have you ever shared your own development of a scholarly identity with your student?
How important is scholarly identity development to you?
What do you see as your own role within your discipline?

- Will your Doctoral student fulfill the same or a similar role in the discipline after they receive their PhD?
- What are you doing to actively prepare him/her for that role?

Do you engage in scholarly activities both within and outside of your educational institution?
Do your Doctoral students share in any of those activities?
Why/why not?
Do you engage in interdisciplinary collaborations? Why/why not?
Do your Doctoral students share in any of those activities?
Why/why not?
Do you reflect on or assess your own teaching practices? Why/why not?
Do you assess the teaching practices of your Doctoral students?
Why/why not?
Have you done any research or published on teaching in your discipline? Why/why not?
Do you think it is important to reflect on teaching practices within your discipline?
Why/why not?
How would you describe your leadership style?
What does that mean to you?
Is there anything you feel unsure or uncomfortable about in your role as supervisor?

Do you consider yourself helpful to your student in the process of completing their degree?

In what way?

Do you consider yourself to be friendly with your student?

What does that mean to you?

Is there anything you are dissatisfied with in your relationship with your student?

Do you feel you are understanding of this process your student is undertaking?

In what way?

How would you describe what your student is responsible for in this process to complete the doctoral degree?

What does that mean to you?

How would you describe your own responsibility in this process for your student to complete the doctoral degree?

What kind of freedoms are you able to give your student?

Has that changed over the course of this process?

Do you consider yourself to be strict?

How so?

If you could change one thing about this supervisor-Doctoral student relationship, what would it be?

Is there anything else you would like to share with me?

APPENDIX B

DOCTORAL STUDENT INTERVIEW PROTOCOL

My name is Pamela Garrett. I am a graduate student under the direction of Drs. Mary Lee Smith, Shelly Potts, and Marilyn Thompson in the Mary Lou Fulton Teacher's College at Arizona State University. I am conducting a research study to examine Ph.D. Completion as it relates to the relationship between Doctoral students and their advisor/supervisor/mentor.

I am inviting your participation which will involve approximately one-half hour to fill out an online survey and one hour for a follow-up interview. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. Your participation in this study will help to improve the doctoral experience at Arizona State University. There are no foreseeable risks or discomforts to your participation. Should you decide to withdraw from this study, it will not affect your standing at ASU. You must be 18 or older to participate in this study.

This interview will be transcribed by me or a transcriptionist who will not be provided with your identity. All electronic forms of this transcript will be encrypted and any hard copies will be in my possession only. Audiotapes will be kept for three years, locked, in my possession in my home office, accessible only to me, and then erased. Your responses will be kept confidential. Any identifying information will be kept in a separate file, also locked and stored in my home office, accessible only to me, and will be shredded at the same time as the audiotapes are erased. The results of this study may be used in reports, presentations or publications, but your name will not be used and identifying details will be changed to protect your identity.

I would like to audiotape this interview. The interview will not be recorded without your permission. Please let me know if you do not want the interview to be taped; you also can change your mind after the interview starts, just let me know.

If you have any questions concerning this research study, please contact the research team by e-mail: Mary Lee Smith, mlsmith@asu.edu; Shelly Potts, shelly.potts@asu.edu; or Marilyn Thompson, mt@asu.edu . If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know now if you wish to be part of the study.

Interview Protocol

How long have you been enrolled in your Ph.D. program?
Is this your first doctoral supervisor?
How were you paired with your supervisor?
How would you characterize your relationship with your supervisor?

- What does that mean to you?

How would you define the term mentor as it relates to your doctoral program?
How many mentors do you have? What kinds of roles do they fulfill?
Do you consider your supervisor a mentor? Why/why not?

- What do you see as the difference between a supervisor and a mentor?

What is/was the best thing about the relationship?

- What does that mean to you?

What is/was the worst thing about the relationship?
Do you feel you are making satisfactory progress? How would you describe the progress?
What skills would you most like to develop?
Does your supervisor ever discuss development of a scholarly identity with you? Please explain.
What do you see as your future role within your discipline?

- What is your supervisor doing to prepare you for that role?
- What are you doing to prepare for that role?

Does your supervisor encourage you to engage in scholarly activities both within and outside of your educational institution?

- Is that important to you?
- How so?

Does your supervisor encourage you to engage in interdisciplinary collaboration?

- Is that important to you?
- How so?

Does your supervisor encourage you to reflect on your own teaching practices?

- Is that important to you?
- How so?

Are you familiar with literature about teaching practices within your discipline?

- Can you give me an example of a teaching practice you believe is important?
- What journals are your best resources for teaching within your discipline?

How would you describe your supervisor's leadership style?

- What does that mean to you?

Is there anything you feel he/she is unsure or uncomfortable about in his/her role as supervisor?

- How important is that to you?

Do you consider your supervisor helpful or friendly with you?
In what way?
Is there anything you sense your supervisor is dissatisfied with in your relationship? Please explain.
Is there anything you are dissatisfied with in your relationship? Please explain.

Do you feel your supervisor understands the process you are undertaking?

- In what way?
- What does that mean to you?

How would you describe what you are responsible for in this process to obtain your doctoral degree?

- What does that mean to you?

How would you describe your supervisor's responsibility in this process for you to obtain your doctoral degree?

- What does that mean to you?

What kind of freedoms are you given by your supervisor?

- How important is that to you?

Has that changed over the course of this process?
Do you consider your supervisor to be strict? Please explain.
If you could change one thing about this supervisor-Doctoral student relationship, what would it be?
Is there anything else you would like to share with me?

APPENDIX C

GRADUATE DIRECTOR-STAFF INTERVIEW PROTOCOL

Program Name: _____
Department: _____
My name is Pamela Garrett. I am a graduate student under the direction of Drs. Mary Lee Smith, Shelly Potts, and Marilyn Thompson in the Mary Lou Fulton Teacher's College at Arizona State University. I am conducting a research study to examine Ph.D. Completion as it relates to the relationship between Doctoral students and their advisor/supervisor/mentor.

I am inviting your participation which will involve approximately one hour for an interview. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. Your participation in this study will help to improve the doctoral experience at Arizona State University. There are no foreseeable risks or discomforts to your participation. Should you decide to withdraw from this study, it will not affect your standing at ASU. You must be 18 or older to participate in this study.

This interview will be transcribed by me or a transcriptionist who will not be provided with your identity. All electronic forms of this transcript will be encrypted and any hard copies will be in my possession only. Audiotapes will be kept for three years, locked, in my possession in my home office, accessible only to me, and then erased. Your responses will be kept confidential. Any identifying information will be kept in a separate file, also locked and stored in my home office, accessible only to me, and will be shredded at the same time as the audiotapes are erased. The results of this study may be used in reports, presentations or publications, but your name will not be used and identifying details will be changed to protect your identity.

I would like to audiotape this interview. The interview will not be recorded without your permission. Please let me know if you do not want the interview to be taped; you also can change your mind after the interview starts, just let me know.

If you have any questions concerning this research study, please contact the research team by e-mail: Mary Lee Smith, mlsmith@asu.edu; Shelly Potts, shelly.potts@asu.edu; or Marilyn Thompson, mt@asu.edu . If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know now if you wish to be part of the study.

What is your position/title?

What are your responsibilities with regard to this program?
How long have you worked with this program?
How many students are usually involved in this program?
How many professors are usually involved with this program?
How are students recruited?
How are the students oriented to the program?

- Written guidelines?
- Formal orientation?
- Community orientation?
- Assignment of an advisor?

Are there social activities for the students?
Do students move through the program as a cohort?
Do the students have a space of their own?
What kinds of interactions occur between faculty and students? (formal and informal; group vs. individual; supervisor/supervisee)

How frequent?

How are the students initiated into the discipline?

- Brownbags?
- Professional associations?
- Meetings & conferences?

How would you describe the culture of the program?
Generally speaking, how would you describe relationships between faculty members?
Generally speaking, how would you describe relationships between students?
Generally speaking, how would you describe relationships between supervisors and supervisees?
Does the overall academic program run the way you think it should?
Is there anything you can recommend be improved about the program?
Is there anything else you would like to share with me?

APPENDIX D

INTRODUCTION AND *IDEAL MENTOR SCALE*

My name is Pamela Garrett. I am a graduate student under the direction of Drs. Mary Lee Smith, Shelly Potts, and Marilyn Thompson in the Mary Lou Fulton Teacher's College at Arizona State University. I am conducting a research study to examine Ph.D. Completion as it relates to the relationship between Doctoral students and their advisor/supervisor/mentor.

I am inviting your participation which will involve approximately one-half hour (or less) to fill out an online survey. You have the right not to answer any question, and to opt out of the survey at any time. Following the survey questions you will be asked to provide a few demographic details to assist us in analyzing data. Based on the data you provide you MAY be invited to participate in a second part of this study. You are under no obligation to do so.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. Your participation in this study will help to improve the doctoral experience at Arizona State University. There are no foreseeable risks or discomforts to your participation. Should you decide to withdraw from this study, it will not affect your standing at ASU. You must be 18 or older to participate in this study.

The results of this survey will be analyzed by me. All electronic forms data collected will be encrypted and any hard copies will be in my possession only. Your responses will be kept confidential. Any identifying information will be kept in a separate file, also locked and stored in my home office, accessible only to me, and will be shredded at the same time as any hard copy of the data at the end of three years. The results of this study may be used in reports, presentations or publications, but your name will not be used and identifying details will be changed to protect your identity.

If you have any questions concerning this research study, please contact the research team by e-mail: Mary Lee Smith, mlsmith@asu.edu; Shelly Potts, shelly.potts@asu.edu; or Marilyn Thompson, mt@asu.edu . If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know now if you wish to be part of the study by taking the survey.

IDEAL MENTOR SCALE

Gail Rose
University of Iowa

Research indicates strong agreement among Ph.D. candidates that the *ideal mentor* would exhibit the following attributes:

- Be experienced in his or her field
- Have a lot of intellectual curiosity
- Always be counted on to follow through when he or she makes a commitment
- Treat research data in an ethical fashion
- Communicate openly, clearly, and effectively
- Be available to students to discuss academic problems
- Challenge students to explore alternative approaches to a problem
- Provide honest feedback (both good and bad) to students about their work
- Express a belief in the student's capabilities

While the above attributes are **central** to an *ideal mentoring relationship*, we know that often such relationships can encompass a wider variety of functions. Furthermore, there are individual differences among Ph.D. candidates with respect to the type of mentoring functions they prefer.

The Ideal Mentor Scale was written to help students identify the relative importance of several additional mentor functions and characteristics.

The Ideal Mentor Scale consists of 34 items that reflect aspects of a mentoring relationship that may or may not be important to you. Please rate each item according to how **important** that mentor attribute is to you now, at your current stage of your graduate program.

Please do not rate an actual person in your life (if you currently have a mentor). Rather, please indicate how important each attribute or function is to your definition of the **ideal mentor**.

Please answer each item by selecting a number from 1-5 according to the following importance scale:

Not at all important		Moderately Important		Extremely Important
1	2	3	4	5

Right now, at this stage of my graduate program, my ideal mentor would….

1. …show me how to employ relevant research techniques
2. …give me specific assignments related to my research problem.
3. …give proper credit to graduate students.
4. …take me out for dinner or drinks after work.
5. …prefer to cooperate with others than compete with them.
6. …help me to maintain a clear focus on my research objectives.
7. …respect the intellectual property rights of others.
8. …be a role model.
9. …brainstorm solutions to a problem concerning my research project.
10. …be calm and collected in times of stress.
11. …be interested in speculating on the nature of the universe or the human condition.
12. …treat me as an adult who has a right to be involved in decisions that affect me.
13. …help me plan the outline for a presentation of my research.
14. …inspire me by his or her example and words.
15. …rarely feel fearful or anxious.
16. …help me investigate a problem I am having with research design.
17. …accept me as a junior colleague.
18. …be seldom sad or depressed.
19. …advocate for my needs and interests.
20. …talk to me about his or her personal problems.
21. …generally try to be thoughtful and considerate.
22. …be a cheerful, high-spirited person.
23. …value me as a person.
24. …have coffee or lunch with me on occasion.
25. …keep his or her workspace neat and clean.
26. …believe in me.
27. …meet with me on a regular basis.
28. …relate to me as if he/she is a responsible, admirable older sibling.
29. …recognize my potential.
30. …help me to realize my life vision.
31. …help me plan a timetable for my research.
32. …work hard to accomplish his/her goals.
33. …provide information to help me understand the subject matter I am researching.

34. …be generous with time and other resources

End Survey Questions

Please provide CONFIDENTIAL answers to the following demographic questions:
(Note: the electronic survey will provide checkboxes/textboxes for these answers)

1. Name
2. E-mail address
3. What degree are you pursuing (MA, MS, Ph.D., etc.)
4. What semester did you first enroll in your program (Spring 2007; Fall, 2007; Summer, 2007, etc.)
5. Are you currently fulltime or part-time?
6. What is the department and name of your program?
7. Do you presently have a supervisor/mentor?
8. Who is your supervisor/mentor?
9. If pursuing a PhD, what requirements have you completed toward your PhD (please check all that apply)?
    - Less than half of courses required for the doctoral degree
    - Completed more than half, but not all of the courses required for the doctoral degree
    - Completed all course work (including practica) required for the doctoral degree
    - Comprehensive exam submission (or equivalent)
    - Comprehensive exam defense (or equivalent)
    - Dissertation Proposal
    - Dissertation Proposal Defense/Colloquium
    - Data collection
    - Data Analysis
    - Dissertation Writing
    - Dissertation Defense
10. What type of position do you hope to hold immediately after completing your degree?
    - Faculty at college or comprehensive university
    - Faculty at research-intensive university
    - Further training or study, e.g. post-doc
    - Researcher in the private sector
    - Researcher in government
    - Administrator in a college or university
    - Teacher/administrator at elementary or secondary level
    - Administrator or manager in the private sector
    - Administrator or manager in the private sector
    - Administrator or manager in government

- Returning to, or continuing, in the same employment/position as prior to PhD
- Professional (self-employed or in an agency)
- Do not plan to work or study
- Other (please specify)

11. What is your gender?
12. What is your age?
13. Race/Ethnicity (select all that apply)
    - African American/Black
    - American Indian/Alaska Native
    - Asian American/Asian
    - Mexican American/Chicano
    - Native Hawaiian/Pacific Islander
    - Other Latino
    - Puerto Rican
    - White/Caucasian
    - Other (please specify)
14. Number of Dependents (not including yourself or your spouse/partner).
15. Citizenship Status (select one)
    - U.S. Citizen or U.S. National
    - U.S. Permanent Resident
    - Temporary Visa (F1, J1, etc.)

Thank you for your participation in this survey! You will be contacted by e-mail if you are invited to participate in Part II of the study. If you are interested in receiving results from this study, please e-mail me at Pamela.Garrett@asu.edu.

APPENDIX E

DOCTORAL STUDENT INVITATION AND *QUESTIONNAIRE ON SUPERVISOR-DOCTORAL STUDENT INTERACTION* SURVEY

My name is Pamela Garrett. I am a graduate student under the direction of Drs. Mary Lee Smith, Shelly Potts, and Marilyn Thompson in the Mary Lou Fulton Teacher's College at Arizona State University. I am conducting a research study to examine Ph.D. Completion as it relates to the relationship between Doctoral students and their advisor/supervisor/mentor.

Based on the information you provided in the first part of my dissertation study, I am inviting your participation in Part II of the study which will involve approximately one-half hour to fill out an online survey about your perception about your mentor's supervisory style, and one hour for a follow-up interview. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. Your participation in this study will help to improve the doctoral experience at Arizona State University. There are no foreseeable risks or discomforts to your participation. There are no foreseeable risks or discomforts to your participation. Should you decide to withdraw from this study, it will not affect your standing at ASU. You must be 18 or older to participate in this study.

The follow-up interview will be transcribed by me or a transcriptionist who will not be provided with your identity. All electronic forms of this transcript will be encrypted and any hard copies will be in my possession only. Audiotapes will be kept for three years, locked, in my possession in my home office, accessible only to me, and then erased. Your responses will be kept confidential. Any identifying information will be kept in a separate file, also locked and stored in my home office, accessible only to me, and will be shredded at the same time as the audiotapes are erased. The results of this study may be used in reports, presentations or publications, but your name will not be used and identifying details will be changed to protect your identity.

I would like to audiotape the follow-up interview. The interview will not be recorded without your permission. Please let me know if you do not want the interview to be taped; you also can change your mind after the interview starts, just let me know.

If you have any questions concerning this research study, please contact the research team by e-mail: Mary Lee Smith, mlsmith@asu.edu; Shelly Potts, shelly.potts@asu.edu; or Marilyn Thompson, mt@asu.edu . If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know now if you wish to be part of the study by taking the survey.

Questionnaire on Supervisor-Doctoral student Interaction (QSDI)©

T. Mainhard, R. van der Rijst, J. van Tartwijk, & T. Wubbles
Utrecht University, Utrecht, The Netherlands, 2009

The following questions should be rated on a five-category frequency scale as follows:

Never/Not at all		Neutral		Always/Very
1	2	3	4	5

My Supervisor…	**Scale Category**
1. …always cooperates, if I want something	CD
2. …humiliates me	OD
3. …acts unconvincingly regarding my initiatives	SO
4. …is quick to criticize me	DO
5. …is unclear during our conversations	SO
6. …trusts me	CS
7. …disbelieves me	OS
8. …helps me	CD
9. …gives thorough feedback on my work	DC
10. …has a bad temper during our discussions	OD
11. …is dissatisfied about my progress	OS
12. …follows my proposals	SC
13. …anticipates possible misunderstandings between us	CD
14. …thinks I know nothing	OS
15. …is impatient toward me	OD
16. …is critical of my work	DO
17. …listens to me	CS
18. …creates an atmosphere of ambiguity during our meeting	SO
19. …is strict when evaluating my progress	DO
20. …demands a lot from me	DO
21. …acts confidently when discussing my papers	DC
22. …says that I am unskilled	OS
23. …always explains comprehensibly when I ask something	DC
24. …gives me clear guidance	DC
25. …thinks that I am dishonest	OS
26. …supports me	CD
27. …gives me a lot of advice	DC
28. …is indecisive about my initiatives	SO
29. …acts professionally during our meetings	DC
30. …reacts enthusiastically about my initiatives	CD
31. …acts irritable with me	OD
32. …is someone I can rely on	CD
33. …pays attention, if I have something to say	CS
34. …is uncertain during our meetings	SO
35. …allows me to make my own decisions	SC
36. …believes that I am untrustworthy	OS

37. …shares my sense of humor	CS
38. …is timid in our discussions	SO
39. …lets me choose my own direction	SC
40. …is easily impressed by me	SC
41. …immediately corrects me if I do something wrong	DO

Thank you very much for your participation in this survey. I will be contacting you soon to schedule your interview appointment, if it has not already been scheduled. If you have any questions, please feel free to contact me at Pamela.Garrett@asu.edu.

APPENDIX F

SUPERVISOR INVITATION AND *QUESTIONNAIRE ON SUPERVISOR-DOCTORAL STUDENT INTERACTION* SURVEY

My name is Pamela Garrett. I am a graduate student under the direction of Drs. Mary Lee Smith, Shelly Potts, and Marilyn Thompson in the Mary Lou Fulton Teacher's College at Arizona State University. I am conducting a research study to examine Ph.D. Completion as it relates to the relationship between Doctoral students and their advisor/supervisor/mentor.

I am inviting your participation which will involve approximately one-half hour to fill out an online survey and one hour for a follow-up interview. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. Your participation in this study will help to improve the doctoral experience at Arizona State University. There are no foreseeable risks or discomforts to your participation. There are no foreseeable risks or discomforts to your participation. Should you decide to withdraw from this study, it will not affect your standing at ASU. You must be 18 or older to participate in this study.

The follow-up interview will be transcribed by me or a transcriptionist who will not be provided with your identity. All electronic forms of this transcript will be encrypted and any hard copies will be in my possession only. Audiotapes will be kept for three years, locked, in my possession in my home office, accessible only to me, and then erased. Your responses will be kept confidential. Any identifying information will be kept in a separate file, also locked and stored in my home office, accessible only to me, and will be shredded at the same time as the audiotapes are erased. The results of this study may be used in reports, presentations or publications, but your name will not be used and identifying details will be changed to protect your identity.

I would like to audiotape the follow-up interview. The interview will not be recorded without your permission. Please let me know if you do not want the interview to be taped; you also can change your mind after the interview starts, just let me know.

If you have any questions concerning this research study, please contact the research team by e-mail: Mary Lee Smith, mlsmith@asu.edu; Shelly Potts, shelly.potts@asu.edu; or Marilyn Thompson, mt@asu.edu . If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know now if you wish to be part of the study by taking the survey.

Questionnaire on Supervisor-Doctoral student Interaction (QSDI)©
T. Mainhard, R. van der Rijst, J. van Tartwijk, & T. Wubbles
Utrecht University, Utrecht, The Netherlands, 2009

NOTE: The survey questions have been edited to reflect the Supervisor self-evaluation point of view.

The following questions should be rated on a five-category frequency scale as follows:

Not at all important		Moderately Important		Extremely Important
1	2	3	4	5

With my Student, I…	**Scale Category**
1. …always cooperate, if he/she wants something	CD
2. …humiliate him/her	OD
3. …act unconvincingly regarding his/her initiatives	SO
4. …am quick to criticize him/her	DO
5. …am unclear during our conversations	SO
6. …trust him/her	CS
7. …disbelieve him/her	OS
8. …help him/her	CD
9. …give thorough feedback on his/her work	DC
10. …have a bad temper during our discussions	OD
11. …am dissatisfied about his/her progress	OS
12. …follow his/her proposals	SC
13. …anticipate possible misunderstandings between us	CD
14. …think he/she knows nothing	OS
15. …am impatient toward him/her	OD
16. …am critical of his/her work	DO
17. …listen to him/her	CS
18. …create an atmosphere of ambiguity during our meetings	SO
19. …am strict when evaluating his/her progress	DO
20. …demand a lot from him/her	DO
21. …act confidently when discussing his/her papers	DC
22. …say that I he/she is unskilled	OS
23. …always explain comprehensibly when he/she asks something	DC
24. …give him/her clear guidance	DC
25. …think that he/she is dishonest	OS
26. …supports him/her	CD
27. …give him/her a lot of advice	DC
28. …am indecisive about his/her initiatives	SO
29. …act professionally during our meetings	DC
30. …react enthusiastically about his/her initiatives	CD
31. …act irritable with him/her	OD
32. …am someone he/she can rely on	CD
33. …pay attention, if he/she has something to say	CS

34. …am uncertain during our meetings	SO
35. …allow him/her to make his/her own decisions	SC
36. …believe that he/she is untrustworthy	OS
37. …share his/her sense of humor	CS
38. …am timid in our discussions	SO
39. …let him/her choose their own direction	SC
40. …am easily impressed by him/her	SC
41. …immediately correct him/her if he/she does something wrong	DO

Thank you very much for your participation in this survey. I will be contacting you soon to schedule your interview appointment, if it has not already been scheduled. If you have any questions, please feel free to contact me at Pamela.Garrett@asu.edu.

APPENDIX G

E-MAIL INVITATION TO PARTICIPATE IN PHASE 1

Subject: Invitation to participate in my Dissertation study
Dear

This e-mail is a sincere appeal to you as a graduate student to participate in my dissertation study. The intent of this study is two-fold. This study will attempt to explore the possibility of modifying the American model of graduate education toward a more explicit doctoral pedagogy. Using a sequential, mixed-method design, this study will explore graduate students' perceptions of their *ideal* mentor, and, second, graduate education as it relates to the supervisor/advisor/mentor relationship and development of the scholarly identity. You have been invited to participate because you are a graduate student enrolled at Arizona State University. Beyond one reminder e-mail, you will receive no further communication related to this study unless you opt to participate in the first phase.

The first phase of my study is to complete a short survey that will take you less than ½ hour to complete. Depending on how you respond to the survey questions, you may be invited to participate in the second phase. The second phase is described more fully in its subsequent invitation, but essentially, in Phase 2, you and your mentor (if he or she chooses to participate) will fill out another less than 30 minute survey and participate in a one-on-one semi-structured interview, separately, with the researcher. Your participation in Phase 2 is not dependent on participation by your mentor. You may opt out of participating in the study at any point with no effect on your standing at ASU. You must be 18 or older to participate in this study.

If you are invited to participate in the second phase of this study, you will receive an e-mail from me using an e-mail address that you can provide at the end of the survey in Phase 1. If you are interested in participating, please click the link below and read a more thorough informed consent before continuing to the survey. Participation is voluntary. By clicking the link below, you are implying consent, but you may opt out at any point without penalty.

https://www.surveymonkey.com/s/FX3JN67

Thank you very much in advance for your willingness to participate in my dissertation study. If you have any other questions, please feel free to e-mail me at the address below.

Warm Regards,
Pamela S. Garrett
Pamela.Garrett@asu.edu
Doctoral Candidate
Educational Psychology
Mary Lou Fulton Teachers College

APPENDIX H

REMINDER E-MAIL TO PARTICIPATE IN PHASE 1

Subject: Reminder to participate in my Dissertation study
Dear

This reminder e-mail is a follow up to the invitation you received one week ago. If you have already filled out the online survey, please disregard this e-mail.

I am making a sincere appeal to you as a graduate student to participate in my dissertation study. The intent of this study is two-fold. This study will attempt to explore the possibility of modifying the American model of graduate education toward a more explicit doctoral pedagogy. Using a sequential, mixed-method design, this study will explore graduate students' perceptions of their *ideal* mentor, and, second, graduate education as it relates to the supervisor/advisor/mentor relationship and development of the scholarly identity. You have been invited to participate because you are a graduate student enrolled at Arizona State University. You will receive no further communication related to this study unless you opt to participate in the first phase.

The first phase of my study is to complete a short survey that will take you less than ½ hour to complete. Depending on how you respond to the survey questions, you may be invited to participate in the second phase. The second phase is described more fully in its subsequent invitation, but essentially, in Phase 2, you and your mentor (if he or she chooses to participate) will fill out another less than 30 minute survey and participate in a one-on-one semi-structured interview, separately, with the researcher. Your participation in Phase 2 is not dependent on participation by your mentor. You may opt out of participating in the study at any point with no effect on your standing at ASU. You must be 18 or older to participate in this study.

If you are invited to participate in the second phase of this study, you will receive an e-mail from me using an e-mail address that you can provide at the end of the survey in Phase 1. If you are interested in participating, please click the link below and read a more thorough informed consent before continuing to the survey. Participation is voluntary. By clicking the link below, you are implying consent, but you may opt out at any point without penalty.

https://www.surveymonkey.com/s/FX3JN67

Thank you very much in advance for your willingness to participate in my dissertation study. If you have any other questions, please feel free to e-mail me at the address below.

Warm Regards,

Pamela S. Garrett
Pamela.Garrett@asu.edu
Doctoral Candidate
Educational Psychology
Mary Lou Fulton Teachers College

APPENDIX I

E-MAIL INVITATION TO DOCTORAL STUDENT TO PARTICIPATE IN PHASE 2

Subject: Invitation to Participate in Phase 2 of my Dissertation study

Dear _____,

Please accept my sincere appreciation for participating in Phase 1 of my Dissertation study! I am writing to invite you (and your mentor) to participate in Phase 2 of the study. You must be 18 or older to participate in this study.

Phase 2 will consist of you, and your mentor, each taking an online survey that will take less than ½ hour to complete. Subsequent to that online survey, each of you will be asked to participate in a semi-structured interview that will take approximately one hour or less of your time. Your participation in this phase of the study is not dependent upon participation by your mentor, but participation by your mentor is highly encouraged. If you prefer to invite your mentor to participate, please do so. If they agree, please send me an e-mail and I will contact them with this same e-mail.

If you choose NOT to participate in Phase 2 of this study, please reply to this e-mail that you are declining to participate so that the invitation may be issued to another Doctoral student who may be able to participate.

If you are interested in participating in Phase 2, please click the link below and read a more thorough informed consent before continuing to the survey. Participation is voluntary. By clicking the link below, you are implying consent, but you may opt out at any point without penalty.

[link to survey]

Thank you very much in advance for your willingness to participate in Phase 2 of my dissertation study! If you have any other questions, please feel free to e-mail me at the address below.

Warm Regards,

Pamela S. Garrett
Pamela.Garrett@asu.edu
Doctoral Candidate
Educational Psychology
Mary Lou Fulton Teachers College

APPENDIX J

E-MAIL INVITATION TO DOCTORAL SUPERVISOR TO PARTICIPATE IN PHASE 2

Subject: Invitation to Participate in Phase 2 of my Dissertation study

Dear _____,

Your Doctoral student, _____, participated in Phase 1 of my Dissertation study. I am writing to invite you (at their request) to participate in Phase 2 of the study. You must be 18 or older to participate in this study.

Phase 2 will consist of you, and your Doctoral student, each taking an online survey that will take less than ½ hour to complete. Subsequent to that online survey, each of you will be asked to participate in a semi-structured interview that will take approximately one hour or less of your time. Your participation is highly encouraged.

If you choose NOT to participate in Phase 2 of this study, please reply to this e-mail that you are declining to participate.

If you are interested in participating in Phase 2, please click the link below and read a more thorough informed consent before continuing to the survey. Participation is voluntary. By clicking the link below, you are implying consent, but you may opt out at any point without penalty.

https://www.surveymonkey.com/s/ZN2NZFC

Thank you very much in advance for your willingness to participate in Phase 2 of my dissertation study! If you have any other questions, please feel free to e-mail me at the address below.

Warm Regards,

Pamela S. Garrett
Pamela.Garrett@asu.edu
Doctoral Candidate
Educational Psychology
Mary Lou Fulton Teachers College